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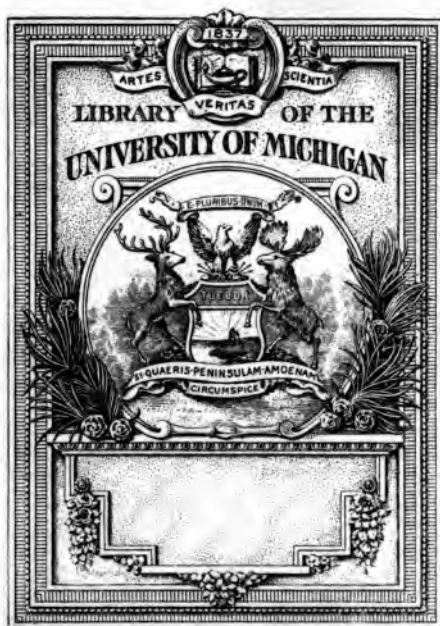
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At the meeting of January 21, 1896, DR. THOMAS DWIGHT spoke upon

CASES OF UNILATERAL KIDNEY, TRUE AND FALSE, illustrating his remarks with specimens and drawings upon the blackboard. He emphasized the subject as of importance by recalling his warning to the surgeon, given at the International Congress in Washington, to be certain that there was a second kidney before removing the first. One specimen was demonstrated with the kidney, artery and vein on the left side — the usual position — the suprarenal capsules were present on both sides, and this, too, is the usual condition of things.

DR. LANGDON FROTHINGHAM described

AN APPARENTLY NEW FORM OF TUBERCULOSIS occurring as a peculiar form of intestinal lesion in a cow, and differing in several details from ordinary

tuberculosis. The following conclusions were reached: (1) There occurs an infiltrated form of intestinal tuberculosis without ulceration and invisible to the naked eye. (2) This form may possibly be caused by infection, through the mouth, with the bacilli of avian tuberculosis; or (3) the bacilli of mammalian tuberculosis can suffer marked morphological alterations and loss of their infectious and toxic action without apparent change in the general feeding and management of the animal. (4) In apparently negative results upon autopsy of animals that have reacted after the injection of tuberculin, the probability is much greater that tuberculosis is really present, but not discovered, than that it is absent.

DR. F. S. LOCKE read a paper upon

#### ARTIFICIAL FLUIDS AS UNINJURIOUS AS POSSIBLE TO ANIMAL TISSUES.

Three conditions especially have to be fulfilled in such fluids: (1) The presence of small amounts of calcium (for example, .02%  $\text{Ca Cl}_2$ ) and potassium (for example, .01%  $\text{KCl}$ ) salts, in addition to sodium chloride. (2) Freedom of the distilled water used from traces of compounds of the heavy metals. (3) *n/* Isotopy with the tissues of the animal in question. For the fulfilment of the last condition in the case of mammals, the solution must contain .9 to 1%  $\text{NaCl}$  instead of .6% as in the case of the frog. In cases of hemorrhage, the action of calcium salts injected intravenously in increasing the coagulability of the blood is

an especial reason for fluids used for infusion containing them.

DR. W. T. PORTER presented by title

A COMMUNICATION UPON THE VASO-MOTOR NERVES  
OF THE HEART.



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No. 2.  
FEBRUARY, 1896.

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At the meeting in February, 1896, Dr. J. L. Good-  
ALE read a paper on

THE IDENTITY OF WANDERING RASH OF THE TONGUE,  
AND MÖLLER'S SUPERFICIAL GLOSSITIS.

Dr. H. P. BOWDITCH read a paper on

PHOTOGRAPHS OF HEMOGLOBIN BANDS (GAMGEE).

He said: The photograph which I have to show is one which represents the absorption band of hemoglobin, recently discovered by Gamgee in the extreme violet portion of the spectrum. It is interesting to note that this band (like those previously known) shifts its position in accordance with the condition of oxidation of the hemoglobin.

Dr. G. W. FITZ demonstrated

A WORKING MODEL OF THE EYE WITH ELASTIC  
LENS.

The apparatus consisted of a skeleton eye set in gymbals to allow for free motion in vertical and hori-

zontal planes. The front of the eye carried an elastic lens made by fastening a sheet of gelatine over a water-chamber with a glass back. The gelatine was bulged more or less as the water pressure in the chamber was increased or diminished by raising or lowering the reservoir connected with it by a rubber tube. A portion of the retina was represented, including the yellow and blind spots, which served the purpose of a screen for receiving the images of candles used as sources of light.

The optical conditions involved in normal vision, accommodation to near and far objects, the use of the iris, near and far sight and correction by lenses, the blind spot and corresponding points of retina, binocular vision, convergence, estimation of distance, and Sheiner's experiments were shown to be demonstrable by means of the model. The apparatus is small enough to be easily handled by students and was designed for actual use by them in experimentally studying these conditions.







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**No. 3.**

**MARCH, 1896.**

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**At the meeting held March 17, 1896, Dr. FRANZ PFAFF read a paper on**

**AN EXPERIMENTAL INVESTIGATION OF THE HUMAN BILIARY SECRETION, AND OF THE INFLUENCE OF SO-CALLED CHOLAGOGUES UPON IT.**

The subject of the investigation was a female patient of the Massachusetts General Hospital. Dr. H. H. A. Beach had operated on the patient for distention of the gall-bladder. The gall-bladder was stitched to the abdominal wall, laid open and thick green bile removed. As a result of the operation a fistula remained through which all the bile secreted was discharged. The jaundice, which existed before, disappeared completely in the course of a few weeks, the urine becoming bile free. The feces remained completely clay-colored. At the time the investigation was begun by Dr. Pfaff and Mr. A. Balch, a student in the Harvard Medical School, the patient felt perfectly well and had

gained somewhat in flesh, in a fortnight from 118 pounds to  $118\frac{1}{2}$  pounds. The bile escaping through the fistulous opening was collected in graduated jars, measured and analyzed each six hours. The specific gravity, the total amount of solids and the ash of each sample of bile were determined.

The influence of human bile, ox bile, salol, sublimate and calomel on the daily excretion, and the composition of the bile was studied. Human bile and ox bile, dried and made into pills, increased the daily secretion and the amount of solids. Salol had scarcely any effect. Sublimate and calomel slightly decreased the daily secretion, both of liquid bile and solids. During the time of observation, now more than two months, the patient has remained perfectly well, and has increased in weight from  $118\frac{1}{2}$  to 126 pounds.

DR. G. W. FITZ demonstrated

#### A NEW METHOD OF DETERMINING THE AMOUNT OF CARBONIC ACID IN THE AIR OF ROOMS,

devised for practical use in school-rooms, factories and stores, where the standard methods cannot be used on account of difficulty and expense.

The process is essentially a volumetric analysis, and consists in taking a measured volume of lime-water colored with phenolphthalin which is neutralized by a certain amount of carbonic acid, and shaking the solution successively with small, determined volumes of air until this amount of carbonic acid is obtained, as shown by the decolorization of the solution. Then,

by means of a table prepared empirically the number of parts of carbonic acid in 10,000 of air, corresponding to the amount of air, is read off without farther trouble. The comparative tests of this method with Pettenkofer's show that it is accurate within a moderate error, which can probably be reduced by care and experience. The shaking is done in a specially devised shaker which measures the air as it is used and is small enough to be readily handled. Enough vials (10 c. c.) for a day's testing can be easily prepared in the morning and carried in the pocket, together with the shaker, to be used when desired.

DR. W. F. WHITNEY showed

THREE RABBITS INOCULATED WITH SUSPECTED  
STREET RABIES,

which demonstrated the typical progressive paralysis of true rabies.



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No. 4.  
APRIL, 1896.

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MEETING of April 21, 1896.

THE CENTROSOME AS A PERMANENT ORGAN OF THE  
CELL,

by E. G. GARDINER, Ph.D.

To the cytologist one of the most interesting phases of cell life is that of karyokinitic division. The changes which occur at this time, bring out with emphasis certain structural features which may be hardly discernible in the resting cell.

The *corpuscules centraux* of E. van Beneden or *centrosomes* as they have subsequently been called by Boveri, are eminently conspicuous structures during karyokinitic division, but until comparatively recently they were believed to be of cytoplasmic origin, and to exist only during cell division. With the development of a finer microscopic technique they have been demonstrated in a large variety of cells in the resting stage. That is, in the resting cell a minute structure, a centrosome, distinct both from the cytoplasm and from the nucleus, is found. At the ap-

proach of the prophase, this structure divides into two ; each daughter structure, or centrosome, moves around the nucleus, until they lie opposite to each other and there form the centres of the asters. In this position they were first recognized and described as *aster centres*, *attraction-spheres*, *centro-spheres* or *centrosomes* by different authors. Also these names or some of them at least, have been applied by some to a part of the central structure of the aster, and by others to the whole structure. Hence a good deal of confusion has arisen in the terminology.

After the anaphase is past the centrosomes in the daughter cells lie dormant while the daughter cells remain in resting stage, but if karyokinitic division is to be repeated, as in segmenting ova, the centrosome repeats the action just described as occurring in the mother cell. Hence it would appear that in the centrosome, we have an organ which always arises from the division of a parent centrosome, just as the cell nucleus always arises from a nucleus ; it is therefore as much a distinct organ of the cell as the nucleus is. Its function apparently is to regulate karyokinesis, and some eminent cytologists hold that without the centrosome karyokinitic division cannot occur. In certain cells endowed with contractile power, such as chromatophores, leucocytes, muscle cells, etc., the centrosome is at all phases, a far more conspicuous structure than in most cells not so endowed. This fact corresponds well with the observation that in ordinary cells the centrosome is most conspicuous during karyokinesis, for motion is present in all cases of karyokinitic division.

In the fertilization of the ovum the centrosome plays an important part, but its action does not appear to be the same in all forms. In cases where a "quadrille of the centrosomes" occurs the centrosomes of the first segmentation asters are each due to the union of half of the sperm and half of the ovum centrosomes. In other cases the centrosomes of the first segmentation astro-spheres seem to owe their origin entirely to the sperm centrosome, while in still other forms which have been studied the ovum centrosome is alone responsible for the centrosomes of segmentation.

The number of observations on this stage of fertilization is still but few, and it is possible that when a larger number of forms have been thoroughly studied a greater similarity in the behavior of the sperm and ovum centrosomes will be discovered, or the reason for this diversity of action will be found. At present, however, the number of facts known form too small a basis on which to found general laws.

DR. HAROLD C. ERNST gave a

PRELIMINARY DESCRIPTION OF THE STAPHYLOCOCCUS AUREUS LIQUEFACIANS,

obtained from a fatal case of puerperal fever, and studied by Messrs. Flint, Howland and Frost — more especially in the later time by the former.

The peculiar characteristics of this bacterium are, that at first it was a streptococcus of very marked appearance — the individual cells being of the average size of the staphylococci, and the chains containing



from two to ten and sometimes more cells; but as the virulence has been increased by rapid passing through animals, the chain formation has gradually disappeared and the bacterium has looked more and more like a staphylococcus, until at the extreme degree of virulence now reached, that one-tenth of a centimetre of a bouillon culture injected subcutaneously kills a rabbit in from fifteen to twenty hours, the microscopic appearances are distinctly those of an ordinary staphylococcus. The chain formation makes its reappearance, however, after a few generations passed through fluid media, so that the alliance with the staphylococci is only temporary. The results produced in the animals are not in the least like those of the ordinary staphylococcus invasion, for at no time, with a comparatively weak or with the strongest cultures, has there ever appeared any sign of pus formation. The effects are due to a pure septicemia, with large numbers of the bacteria in the peritoneal fluid, the blood and scrapings from the various organs.

The other main characteristics of the bacterium are that it grows in the various nutrient media with the early appearance of fine white colonies like the ordinary streptococci, but that later these colonies take on a golden-yellow color; and that gelatine is liquefied slowly during the growth of cultures in it. This is a preliminary study of the bacterium in question; but if the results thus far obtained are verified, they are of great importance in connection with the production of a streptococcus antitoxine.

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NOVEMBER, 1896.

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At the meeting held November 17, 1896, DR.  
THEODORE HOUGH read a paper on

THE DURATION OF CARDIAC STAND-STILL WITH DIFFER-  
ENT STRENGTHS OF VAGUS INHIBITION.

During some previous work the speaker had noticed that the duration of cardiac stand-still was practically independent of the strength of vagus stimulation; and it was shown that this was not because stand-still stimuli are necessarily maximal inhibitory stimuli. A few experiments, however, seemed to indicate that when the stimulating current was just able to stop the heart (minimal stand-still stimuli) the duration of stoppage was shorter than with stimuli of but slightly greater strength. In these experiments the strength of stimulus was not known to be absolutely constant, because bichromate cells were used in the primary circuit of the Du Bois Reymond induction coil; variations of contact in the interrupter might also at times introduce errors; and it is clear that the early escape from minimal stand-still stimuli might be the result of diminution in the strength of

stimulus rather than to the physiological conditions which obtain during inhibition.

In the present research made by the speaker and Mr. M. O. Leighton, these errors were eliminated in the following way: 1, by the use of a storage cell in the primary circuit; the flow of current from these cells will remain practically uniform for hours; 2, by interrupting the primary circuit with the revolutions of an electric motor run at a constant rate of speed, the contact being made by friction against a spring, thus keeping the surfaces clean. The point of minimal stimulation was found by diminishing the resistance in a German silver Rheocord in the primary circuit until the heart stopped.

The animals used were dogs and the results leave no doubt that the conclusions indicated by the former series of experiments were essentially correct.

Other experiments confirmed fully the further conclusion that after the current has been but slightly increased beyond the minimal, further increase does not affect the duration of stand-still.

DR. CHARLES HARRINGTON read papers on

THE SUPPOSED ACTION OF THE COMMERCIAL LITHIA WATERS; AND SOME HYGIENIC DIETETIC THERAPEUTIC AND ECONOMIC FACTS CONCERNING LIQUID MALT EXTRACTS.

#### LITHIA.

Dr. Harrington pointed out that the benefit derived from the use of the commercial lithia waters was due largely to the action of water itself and partly to the restricted diet and more or less complete abstention from alcohol, and not at all to lithia. The three leading lithia waters were obtained by him in open

market and subjected to chemical analysis. In the published analyses the amount of lithia claimed to be present in these waters are respectively about two, eight and fourteen grains per gallon. Two of the waters proved to be very rich in lime salts and absolutely free from lithia: the other was a very soft water containing less total residue than was claimed for lithia alone, and a trace of lithia too small for accurate determination.

#### MALT.

Twenty-one different brands of liquid malt extract were obtained and analyzed. That they were not true malt extracts is shown by the fact that in no one was the slightest diastasic power; all were alcoholic, some being stronger than beer, ale, or even porter. Six contained less than three per cent., five contained between three and four per cent., four between four and five per cent., two between five and six per cent., three between six and seven per cent., and one over seven per cent. of alcohol. In food value they proved to be about equal to heavy beers and porters. In a number of specimens a large amount of salicylic acid was detected, the largest amount being found in one which claims to have been "made in Germany."

DR. THEOBALD SMITH demonstrated

#### A SIMPLE CULTURE APPARATUS FOR ANAEROBIC BACTERIA,

consisting in an application of the principle of the fermentation tube on a large scale.

DR. C. P. FLINT described

#### A NEW CULTURE MEDIUM ESPECIALLY FAVORABLE FOR THE GROWTH OF THE STEPTOCOCCI.

Medium is a bouillon consisting of

750 cc water  
250 cc bloodserum  
15 gms peptone  
15 gms grape sugar  
3 gms salt  
3 gms meat extract  
K O H Till alkaline.

Mix, and boil in water-bath one hour. Then filter. Tube and sterilize in the Arnold sterilizer one hour and one hour the following day. A slightly cloudy amber yellow liquid results.

Streptococci grow abundantly in 24 hours and cause a flakey precipitate filling the lower portion of the tube.

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At the meeting held December 15, 1896, DR. W. T. PORTER (for Messrs. G. B. Magrath and H. Kennedy) read a paper on

“THE RELATION OF THE VOLUME OF THE CORONARY CIRCULATION TO THE FORCE AND FREQUENCY OF VENTRICULAR CONTRACTION IN THE ISOLATED HEART OF THE CAT.”

If the innominate and left sub-clavian arteries and the venae cavae and right azygos vein are tied, in the cat, and cannulas are placed in the aorta and the pulmonary artery, defibrinated cat's blood supplied through the aortic cannula at a constant pressure of from 50 to 100 min. Hg. will distend the aorta, close the aortic valves, and flow through the coronary arteries into the right heart, whence it will escape by the pulmonary artery.

The coronary blood flows from the pulmonary artery in drops, as a rule, and the number of drops can be

recorded by allowing them to fall on an aluminium plate fastened to the lever of a Marey tambour; the blow upon the lever forces down the rubber membrane of the tambour and causes the writing point of a second tambour, connected with the first by a rubber tube, to rise, and thus to mark the drop upon the smoked paper of a recording drum.

By varying the pressure at which the blood is fed into the aorta, the blood may be made to flow through the coronary vessels slowly or rapidly at the pleasure of the operator.

If now the interior of the left ventricle is connected with a membrane manometer, the force and frequency of the ventricular contractions will be recorded.

The heart and the blood in our experiments were kept at a sufficiently constant temperature, and the variations in the size of the escaping drops were too slight to constitute a source of error.

By this method, therefore, the heart is completely isolated from both the systemic and the pulmonary circulation, the volume of the coronary circulation is under control and is accurately recorded, and the force and frequency of ventricular contraction are recorded.

We have made the following observations:—

(1.) When the volume of the coronary circulation is diminished, the force of ventricular contraction is also diminished. A return to the original volume is accompanied by a return to the original force of contraction.

(2.) The change in force is synchronous with the change in the volume of coronary circulation.

(3.) The frequency of heart beat is little changed, often less than 5 per cent. and seldom more than 10

per cent., by even a great change in volume of blood supply, for example 70 per cent., although the force of contraction may be changed more than 50 per cent.

Certain other observations were incidentally made. A flow of blood from the veins of Thebesius into the left side of the heart was demonstrated. The absence of fibrin in blood repeatedly passed through the isolated heart muscle was noted. The heart was seen to contract vigorously on a very small supply of food material, for example, 3 to 5 cc. per minute. Slight distention of the left ventricle often checked the coronary flow. And, finally, it was seen that strong fibrillary contractions continuing more than half an hour may give place to regular coordinated contractions.

DR. W. T. COUNCILMAN ON

**"AN UNUSUAL ACTION OF THE DIPHTHERIA BACILLUS."**

The diphtheria bacillus usually grows on free surfaces and its action consists in the production of necrosis with fibrinous exudation. The bacilli are found in considerable numbers and in characteristic grouping both on the surface and within the membrane. It was at first supposed that the bacilli were only found in such situations. The results of the cultures of organs in death from diphtheria show that in a large proportion of cases the bacilli are also found in the internal organs, particularly in the lungs and in the liver. In the lungs there may be a simple extension of the diphtheritic process into the finer bronchi combined with broncho-pneumonia. In other cases broncho-pneumonia is found without any diphtheritic inflammation of the bronchi, and the diphtheria bacilli are found on microscopic examination in such relation



with the pneumonic process, that they must be regarded as the cause. They may be the only organisms present in the lung although more usually they are associated with other organisms, either streptococci or pneumococci. They have also been found in cases of endocarditis without any sort of complications.

Dr. Leary also found them in an abscess which developed about a hair follicle and which appeared two days after an autopsy on a case of diphtheria. The abscess in no wise differed from one of the small abscesses so frequently seen in staphylococcus or streptococcus post-mortem infection. The abscess remained local, and a pure culture of the diphtheria bacillus was found in it which killed a guinea-pig in 48 hours.

The following case shows an example of the action of the diphtheria bacilli which has not yet been observed. The case was that of an individual who came into the hospital in the course of an attack of typhoid fever. He remained in the hospital four weeks, and a week before his death he developed an acute inflammation of the parotid which was followed by purulent infiltration and gangrene of the tissues about the lower jaw.

At the autopsy, typhoid ulcers in a stage of healing, most of them completely healed, were found in the ileum. There was acute swelling of the mesenteric glands and spleen. The lower jaw on the right side was denuded and the surrounding tissue gangrenous. There was purulent infiltration of the parotid and sub-maxillary glands. A soft, partially broken down thrombus was found in the external jugular vein on the same side, and in the lungs numerous foci of embolic pneumonia.

The bacteriological examination showed absence of typhoid bacilli in the cultures. No cultures were made from the thrombus in the external jugular as it was saved for microscopic examination. Cultures from the lungs show large numbers of diphtheria bacilli and a few colonies of staphylococcus.

Microscopic examination of the thrombus in the external jugular showed large numbers of diphtheria bacilli within the thrombus in characteristic grouping, together with a few cocci.

The abscesses in the lung were developed around small branches of the pulmonary arteries. In these, just as in the thrombus in the vein, large masses of diphtheria bacilli were found. In some cases the wall of the artery and the surrounding lung tissue had partially broken down and here the bacilli were found in the tissues. Small branches of the pulmonary artery were also found filled with thrombi containing the bacilli and without any inflammation of the surrounding lung tissue.

The same variability in pathological action is seen in the action of other bacilli. The tubercle bacillus as a rule produces perfectly characteristic lesions which consist in proliferation of the tissue followed by necrosis. The leucocytes which appear in the process are usually secondary to the necrosis.

Dr. Councilman published in the City Hospital Reports, two cases of tuberculosis in which the lesions were distinctly of a suppurative character. The lesions of the lungs macroscopically and microscopically simulate abscesses and would have been so regarded had not the bacteriological examination showed enormous numbers of tubercle bacilli in the tissues. Both of the cases were characterized by enormous numbers of



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At the meeting held January 19, 1897, Dr. J. H. McCOLLOM read a paper on

THE TREATMENT OF DIPHTHERIA BY ANTITOXIN AT THE  
SOUTH DEPARTMENT OF THE BOSTON CITY HOSPITAL.

The South Department, devoted to the treatment of the three principal acute infectious diseases, namely: scarlet fever, diphtheria and measles, was opened August 31, 1895. Previous to this time these diseases had been treated in the Boston City Hospital, proper. It was found that the proximity of these wards to the hospital was a constant menace to the other patients, and also to the employees.

It has been claimed that hospitals for infectious diseases situated in a crowded locality become foci for the spread of disease. From the first of September,

1895, to the first of September, 1896, there were reported to the Board of Health, 3,989 cases of diphtheria. The hospital was taken as a centre, and an analysis of the cases show that within an eighth of a mile radius, 11 cases occurred; one-quarter of a mile, 82 cases; half a mile, 238; three-quarters of a mile, 292, and a mile, 423, making a total of 1,035. The remaining 2,954 existed in other portions of the city, two, three, and in some instances, five miles away. The area of infection of scarlet fever is greater than that of diphtheria. The total number of cases of scarlet fever reported to the Board of Health for the year ending September, 1896, was 1,043. Within an eighth of a mile from the hospital there were no cases; one-quarter of a mile, 68 cases; half a mile, 71 cases; three-quarters of a mile, 75 cases; within a mile, 72, making a total of 286. The remaining 757 occurred more than a mile from the hospital.

The study and treatment of diphtheria has assumed a new phase since the introduction of antitoxin. The course of the disease has become shortened since the use of antitoxin. The most malignant types have been treated successfully. The type of the disease has not become milder in late years.

In Boston, from 1878 to 1894, the average death-rate was 30.7. In the Boston City Hospital, from 1891 to 1894, when antitoxin was not used, the percentage of mortality was 46. In the South Depart-

ment, for a period of 13 months, when antitoxin was used, the percentage of mortality was 13.4. If the 70 patients who were admitted in a moribund condition were eliminated, it would bring the death-rate down to 10.3.

In laryngeal cases antitoxin is of very great benefit.

At the Boston City Hospital, for the year ending January 31, 1895, there were 89 intubations and 74 deaths, giving a percentage of recoveries of 17. These cases did not have antitoxin. In the South Department for 13 months, ending October, 1896, there were 200 intubations, where antitoxin was administered, with a percentage of recoveries of 46.5.

An analysis of the 1,972 cases treated shows that 1,074 had membrane on each tonsil: 1,030 of these were discharged well; 44 died. Of the remaining 898 cases 226 had membrane on one tonsil, 3 of whom died; in 202 cases the membrane covered each tonsil, the uvula and the palate, 66 of these cases died; membrane was found on each tonsil and the uvula in 195 cases, 34 of these patients died; membrane was found on one tonsil, uvula and palate in 5 instances, none of these patients died; there were 200 intubations with 107 deaths; there were 38 non-operative laryngeal cases in which there was membrane visible, 2 of these patients died; 22 cases of non-operative laryngeal cases in which no membrane was discovered, in this class of cases no death

occurred and 10 cases of tracheotomy; of these cases of tracheotomy 3 died from extension of the membrane, 4 from shock and the remaining 3 from broncho-pneumonia. To sum up the 1,972 cases, 34 per cent. had albuminuria; 12.3 per cent. had urticaria, and the percentages of cases in which it was necessary to give two doses of antitoxin was 8.9.

Of the 1702 non-laryngeal cases the culture was negative in 100 instances or 5.8 per cent. In the laryngeal cases it is the exception that a positive culture is obtained so far as the presence of the bacilli of diphtheria is concerned, and yet in this class of cases 77 were positive of the 270.

It has been stated that albuminuria is caused by the use of antitoxin. Of the 1,972 patients treated with antitoxin 34 per cent. had albuminuria, which proves that antitoxin does not increase the frequency of albuminuria as this is not as large a per cent. as occurs in cases not treated by antitoxin. In 173 cases the urine was examined before and after the administration of antitoxin. Of these 173 cases it was found that in 99 instances albumen was absent both before and after the administration of antitoxin, which was without doubt due to the fact that the healing serum was administered before the diphtheritic membrane had increased sufficiently to generate toxin enough to cause albuminuria. In 33 cases the albumen was about the same; in 25 the albumen

was diminished, which seems a sufficient argument against the claim that antitoxin causes albuminuria. In 16 cases the albumen was increased but not to a sufficient extent to cause any special anxiety. As these were severe cases, the conclusion that albuminuria was caused by the toxin of diphtheria and not by the healing serum is justifiable.

Eruptions of the skin of different varieties have been observed in 244 instances. These eruptions can be classified as urticaria, erythema, a papular eruption, an ecchymotic eruption which must be distinguished from the spots of ecchymosis occurring as an early symptom in severe attacks of diphtheria, a punctiform eruption resembling scarlet fever, and an eruption resembling that of measles.

The percentage of cases in which post-diphtheritic paralysis occurred is 5.8, which is not as large as occurs in cases not treated by antitoxin.

Experience shows that the best place for the injection is the upper part of the thorax, near the posterior axillary line.

From the study of these 1,972 cases of diphtheria treated at the South Department, the following conclusions are justifiable ;

First: That antitoxin is a remedial agent of very great value in the treatment of diphtheria.

Second: That the healing serum does not cause albuminuria.



Third : That its use does not pre-dispose to paralysis.

Fourth : That in the laryngeal cases of diphtheria, the benefit derived from its use is as great, if not greater than in the non-laryngeal cases.

Fifth : That the statement that has been made that antitoxin statistics, because based on mild attacks of the disease are unreliable, is incorrect.

DR. E. W. TAYLOR made some

#### REMARKS ON NEUROGLIA.

Owing to inadequate methods of staining, the histological structure of neuroglia has long remained obscure. It is only within the last few years that methods have been published by means of which a more accurate knowledge has been gained. Among the most important of these are Mallory's phosphomolybdic-acid, haematoxylon phospho-tungstic-acid, haematoxylon, not yet published; and the modified fibrin stain, given out almost simultaneously by Weigert and Mallory. This latter method is the only one which is absolutely selective in its action, and has, thereby, an importance which does not belong to any of the others. The method, as used by Weigert and Mallory, differs considerably in detail, the end result, however, being the same in both.

Mallory's method, with such slight modification as he has made since its original appearance, is as follows :—

Small pieces of tissue from 2 — 5 mil. in thickness are hardened in

1. Formol (10 per cent. water sol.) 4 or more days.
2. Boric acid (saturated aqueous sol.) 4 — 5 days.
3. Directly into bichromate of ammonium (5 per cent. aqueous sol.) 4 — 5 days.
4. 80 per cent. alcohol.
5. 95 per cent. alcohol.
6. Imbed in celloidin.
7. Cut thin sections.

*Staining:* —

8. Fasten section to slide with ether vapor, out of 95 per cent. alcohol, and harden in 80 per cent. alcohol.
9. Stain with solution of anilin oil — gentian violet, 15 — 20 minutes.
10. Wash in salt solution.
11. Iodine, Potassic Iodide,  $\frac{1}{2}$  to 1 minute.
12. Wash with water.
13. Dry with filter paper.
14. Anilin Oil — Xylol (equal parts.) Several changes, blotting after each washing until clearly differentiated.
15. Xylol. Wash thoroughly 3 or 4 times.
16. Canada balsam.

The use of this, or Weigert's analogous method shows the neuroglia to be made up of cells and fibres, whereas previous methods had not distinguished that the fibres were not always actual processes of cells. About this point controversy still exists, Weigert maintaining the absolute disassociation of cells and fibres in adult human neuroglia, whereas Stroebe, using chiefly Mallory's phosphomolybdic-acid method, still maintains the practically constant association of cells and fibres as cell processes.

The investigation, of which this is an outline, was taken up to study further the questions indicated in this diversity of opinion with the aid of two brain tumors, both gliomata, one of an exceedingly fibrous variety and the other cellular, the cells, however, being provided with long processes in every case distinctly an outgrowth from the cell protoplasm, representing possibly a transitional form. The conclusion, from a study of these tumors seemed justified that the development of neuroglia was from cells to cells with processes, which ultimately were differentiated off as independent fibres.

A criticism of the term glio-sarcoma was offered on the ground of the pathological anomaly involved in a mesoblastic tumor—sarcoma—and a tumor derived from epiblast,—glioma,—growing side by side. It was advised to drop the term entirely as confusing and misleading in its significance.

Weigert's dogmatic statement that glioma is invariably made up of new-formed cells and not of new-formed differentiated fibres, was shown to be too far reaching by reference to one of the tumors under discussion.

The following conclusions from the study thus far prosecuted are permissible.

That the problems regarding neuroglia demand varied methods for their adequate study.

That with all the means at our disposal, the absolute determination of the relation of cells and fibres in individual cases remains difficult and, at times, impossible.

That no criterion has yet been offered to determine a fundamental distinction between glioma and sarcoma, and secondly, between glioma and so-called gliosis.

That the development of neuroglia is probably from cells with protoplasmic processes to cells with differentiated and independent fibres.

That herein lies a possible reconciliation of the conflicting views of the ultimate structure of human neuroglia.

DR. W. F. WHITNEY spoke on

#### THE DOUBLE STAINING OF SPERMATOOA.

A drop of the fluid, very much diluted with water, is carefully dried on a cover glass over a lamp and fixed by passing three or four times, rapidly, through the flame. The film is then stained with a strong

aqueous solution of methyl green for a few seconds, warming it over the flame; it is then washed and counter-stained with a one-half per cent. aqueous solution of eosine in the cold for an equal length of time; washed; dried and mounted on xylol balsam. In the human spermatozoa the nucleus is seen as a dark green hemispherical body at the base of the head, while the anterior part and the tail are deeply colored by eosine. In those of the other animals examined (dog, sheep, rabbit, guinea pig) the nucleus occupies nearly the whole of the head, stains but faintly, and has only a narrow zone of protoplasm (eosine stained substance) about it. Those from the dog most closely resemble those from man.

DR. W. F. WHITNEY exhibited

A COLOR SKETCH

of a specimen of cancer of the kidney, painted by Miss Byrnes, whose work of this kind is extremely effective.





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[*Correction:* On page 7, line 5, of number 7 of the JOURNAL, for *Boric* read *Picric*.]

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At the meeting held February 16, 1897, DR. THOMAS DWIGHT read a paper (illustrated by the specimen) on

SOME CONSIDERATIONS ON THE DISTORTION OF THE  
AORTA IN POTT'S DISEASE.

This remarkable specimen has been fully described in the January number of the AMERICAN JOURNAL OF THE MEDICAL SCIENCES, from which account the following extracts are made :

"The specimen about to be described came from the body of a white man, fifty-one years old, dissected during the past winter at the Harvard Medical School. The body was thin and ill-nourished. The deformity was very great, presenting a very sharp prominence in the middle of the back." . . .



"The deformity of the spine was a very great one, situated in the lower half of the thoracic and practically the whole of the lumbar regions. The point of the bend was at the last thoracic spinous process. The angle made by lines drawn through the centres of the vertebral bodies would not have been far from 35°. The length of the spine from the top of the odontoid to the coccyx in a straight line was 40.5 cm., to the promontory 23 cm. The average length to the promontory in the male spine is probably from 60 to 63 cm. I have found this measurement, in fifty of fifty-six male spines, to range from 57 to 66 cm. This shows how great was the shortening. The length of the cervical region was 12.6 cm. (7 mm. below the average), and that of the sacrum and coccyx 17.5 cm., both being measured along the curves. The cervical vertebræ were normal, except for a slight twist to the right, which, perhaps, was not pathological. The same may be said of the bodies of the four upper thoracic vertebræ, and perhaps of the top of the next one. The lower part of the fifth is fused with the sixth, and thence the spine is one piece to the end. There seem to be some remnants of an intervertebral disk below the lost lumbar, but they are slight, and the bone is certainly co-ossified with the sacrum. Owing chiefly to the severity of the lesion, but in part to the necessity of making a ligamentous preparation in order to preserve the aorta, the detail

of the condition of the bodies of most of the vertebræ could not be ascertained. The body of the seventh thoracic lay on that of the third or fourth lumbar, joined to it by bone. The intervening ones were indistinguishably fused into one mass, from the sides of which the ribs emerged. The upper lumbar and lower thoracic were deviated to the right, leaving a hollow, probably occupied by pus. There were but very slight indications of a spiral twist. Seen from behind, the spinous processes were all distinct and without marked lateral deviation. The ribs, excepting the last one on each side, were very close together; those of the right, especially, being directed very strongly upward. The transverse processes in the upper half of the thoracic region were turned far backward so as to make a deep gutter on either side of the spine — additional evidence of the early occurrence of the disease. The sacrum was very long and flat. The flatness, indeed, is probably the cause of the length. There were six sacral vertebræ, of which the first was rather transitional. The coccyx was co-ossified.

“The general course of the aorta was as follows: the termination of the arch apparently began to rest on the spine at the middle of the body of the third thoracic vertebra, whence it descended in a long sweep, first to the left for a short distance, and then without sudden change of direction obliquely down-

ward across the vertebral column to the head of the right eighth rib. This may be called the first curve. It then turned very sharply to make a second, a horizontal curve, still resting on the upper half of the bent spine, running forward, across, and backward, with a slight downward tendency, round and back to the left. The beginning of the second curve is close under and almost parallel to the latter part of the first. The third curve began with another sudden change of direction, and ran obliquely downward and forward along the fourth and fifth lumbers to the median line, where it divided into the iliacs opposite the highest point of the promontory. The length of the first curve, measured along the middle of the vessel, beginning at the level of the lower border of the left subclavian, is 12.5 cm.; that of the second, 11 cm.; and that of the third to the bifurcation, 8 cm., making a total of 31.5 cm. This is probably but a little less, some 3 cm., than the average length."

The question to which I wish to call the attention of the Society is to the cause of the great folds of the aorta, instead of the straighter course along the spine which it would seem more natural for it to adopt. In view of the great changes that have taken place in the spine, one can hardly doubt that the disease is the result of conditions that occurred very early in life, long before the spine or the aorta had reached their complete growth; yet we find the spine

very much shortened and the aorta but some 3 cm. below the average length. It would appear, therefore, that the aorta had continued to grow much more than at first sight seems necessary. I was at one time inclined to think that the specimen presented an exception to the general law of adaptation by which the parts of living organisms accommodate themselves to new conditions. Later it occurred to me that all the intercostal and lumbar branches of the aorta would have been unduly crowded together had the vessel adopted the course of simply following the spine. The question is a purely abstract one, but it seemed to me worth suggesting to the discussion of the Society.

DR. W. T. COUNCILMAN showed

A SPECIMEN FROM A CASE OF TERATOMA OF THE  
HEAD,

from a child six months old, which followed a congenital teratoma of the testicle.

In the teratoma of the head, which developed between the dura mater and the skull, numerous tissues were found. The tumor was composed of cysts with a solid stroma in between. Microscopically there were numerous very small cysts. Some of these cysts were lined with epithelium and showed an abundant formation of hairs. Others were lined with cylindrical epithelium, and were surrounded by definite layers of non-striated muscular tissues.

In the solid portion of the tumor, bone, cartilage, striated muscular fibres, nerves with ganglion cells, and definite brain substance were abundantly present. In the tumor of the testicle of the same case, structures very similar to the retina with the choroid were present.

He spoke of the recent theories with regard to the development of the teratoma of the ovary and testicle which refer them to an abnormal development of the germinal cells of these organs. The teratoma of the head could not have developed from any of the normal tissues in this part, but must be regarded as due to the inclusion of parts coming from an abortive fœtus in the tissues of a well-developed fœtus. It is difficult even by this assumption to explain the growth, for the tissue of the rudimentary fœtus must have been included not in the forming medullary groove, but in the tissues of the wall enclosing this. It is possible that fission of the embryo may have taken place at a very early period before the formation of the germinal layers, and certain of the cells so cast off may have become included in the other tissues, and have formed the tumor.

DR. J. H. WRIGHT reported a case of general

#### FIBRINO-PURULENT PERITONITIS

in a young man, due to infection with the pneumococcus (*micrococcus lanceolatus*), associated with glomerulonephritis of a very typical character,

which had come to autopsy in the laboratory of the Massachusetts General Hospital. No satisfactory infection-atrium for the peritonitis was found. There was some localized acute enteritis.

The lesions in the glomeruli consisted essentially in a swelling, proliferation, and fatty degeneration of the cells of the capillaries of the tuft, together with hyaline degeneration and obliteration of the capillaries. In the renal tabules only a small amount of fatty and hyaline degeneration was present. There were no marked fibroid changes.

This association of a glomerulo-nephritis with certain pneumococcus infections of the heart has been repeatedly observed in the course of the work done under Prof. Councilman's direction here in Boston.

Microscopical preparations showing the renal lesions were demonstrated.

DR. F. B. LUND spoke on

#### ENTEROPTOSIS,

and showed sketches of two instances of this condition found post-mortem, in subjects in the dissecting-room. In one of them there was ptosis of all the abdominal viscera, both kidneys and the spleen being freely movable, the ligaments of the liver lax, so that the lower border of that organ lay in the right iliac fossa, and the stomach enormously elongated, so that its lower border touched the symphysis pubis; the hepatic flexure of the colon

lay in the right iliac fossa. No diagnosis of the condition was made during life. The subject, a female, was 84 years old, an inmate of the almshouse at Tewksbury.

A brief review of the literature of the subject showed that the condition known as enteroptosis had only recently been described, though movable kidney, which is often, perhaps, only a single manifestation of a general ptosis of the viscera, had attracted the attention of clinicians for a longer period.

Colenard, a French physician practising in Lyons, was the first to describe, in a paper published in 1885, the condition of enteroptosis, or falling of the viscera, due to relaxation of their supporting ligaments. The disease, according to him, was of great frequency, and was attributed in the first instance to a sinking of the hepatic flexure and transverse colon, due to the weight of feces accumulated in them. This, by dragging on the greater curvature of the stomach, led to the production of a sharp angle at the junction of the first and second portions of the duodenum, obstruction, dilatation, and ptosis of the stomach. Relaxation of the abdominal wall, due to stretching from repeated pregnancies, emaciation, muscular weakness, constipation, increasing the weight of the transverse colon, and a collapsed condition of the gut in the portions not packed with feces, so that it failed to fill the cavity and do its part towards supporting the other organs, were con-

sidered by Colenard to be the principal causes of the condition. Almost every case of so-called nervous dyspepsia was explained by Colenard by this theory. The chief diagnostic point was the palpation of the prolapsed transverse colon through the abdominal wall.

Ewald, in 1890, reviewed Colenard's work, and gave him credit for first describing the condition, though he claimed that ptosis caused obstruction at the fixed flexures of the bowel, and affirmed that the transverse colon which Colenard felt was really the pancreas. He claimed that the only way to be sure of ptosis of the stomach and transverse colon was to inflate them with air or gas, and mark out their outlines by percussion. Ptosis of the stomach was distinguished from dilatation by the low and nearly vertical position of the lesser curvature. Kultern examined in this manner 89 cases of movable kidney at the clinic of the Augusta Hospital in Berlin, and found the lower border of the stomach at or below the level of the umbilicus 79 times.

Meinert has found gastropptosis in a large number of chlorotic young women. He has found movable kidney frequently in their cases, and considers the enteroptosis to have a casual relation to the chlorosis. He considers the enteroptosis in these cases to be almost invariably due to tight lacing.

The erect position brings the larger viscera into the upper part of the abdomen, and causes their



weight to be largely supported by the peritoneal folds, or so-called ligaments which fixed them to the abdominal walls and diaphragm. The liver, being very firmly held to the diaphragm by strong short ligaments, rarely is proved to be movable. The spleen is frequently movable, and the kidneys very frequently so. The kidneys become movable by the looping of their peritoneal covering due to traumatism, such as coughing, emaciation with absorption of their fatty capsule, and diminution of the general intra-abdominal pressure such as occurs in multiparæ with pendulous bellies.

Intra-abdominal pressure in the body at rest is very low, and, consequently, more strain is thrown upon the supporting ligaments of the viscera. Muscular exertion increases the pressure and takes the strain off the ligaments. Hence the advantages of suitable gymnastic exercises in the treatment of enteroptosis, and the frequent relief afforded by abdominal supports.

Nephrorraphy of a movable kidney may retain that organ in place, but does not in any way relieve the strain of the peritoneal supports of the other viscera. Symptoms due to torsion of the renal vessels, or obstructions of the ureter, it may relieve, but it will not relieve symptoms on the part of the digestive, or the venous, systems which are due to stretching of the supporting ligaments of the other viscera; and in the majority of cases of movable

kidney, the condition of enteroptosis is probably present to a greater or less degree.

Contrary to earlier opinion, movable kidney and enteroptosis are hardly as frequent in women who have not borne children as in multiparæ, and is being found with greater frequency than formerly in males. Tight lacing is probably a frequent cause of the condition in young women.

The rarity with which it is found at autopsies may be due to several causes. It is never fatal of itself; with the body in the horizontal position the organs return to their normal positions, or nearly so, and the looseness of their supports fails to attract attention.

#### HÆMATOPORPHYRINURIA.

DR. J. B. OGDEN showed a specimen of urine containing the rare coloring matter, hæmatoporphyrin. This pigment is identical with Iron-free Hæmatin; in alkaline solution it gives four characteristic absorption bands as follows: One situated midway between Fraunhofer's lines C and D; two between D and E, one of which borders on D, the other nearer to E, and the fourth band, which is dark and broad, lies between B and F, nearer to B. In acid solution there are only two bands, one of which is pale and narrow and bounded on the right by D; the other, broad and dark, is situated midway between D and E.

The specimen of urine has a reddish-brown color,

a sp. gr. of 1025, and contains only a *very slight trace* of albumin, and the microscopic examination of the sediment shows the presence of brown granular casts, renal cells, and only an occasional blood globule. It does not contain more than the faintest trace of Hæmoglobin, if any, as shown by the presence of only the merest trace of albumin and the absorption bands.

The urine was passed by a female — æt. 38 — who entered the Boston City Hospital suffering from diphtheria. Has had heart disease for 12 years. Hysterical.

The diphtheria was followed by what appeared to be diphtheritic neuritis. Because of loss of sleep and the nervous condition, she was given two 10-grain doses of Trional (no Sulphonol). Death took place in about 48 hours. The patient passed this reddish-brown urine about 36 hours before death. No autopsy could be obtained.

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At the meeting held March 16, 1897,  
Dr. M. W. RICHARDSON read a paper upon

**"THE DIAGNOSIS OF TYPHOID CULTURES BY THE USE  
OF DRIED TYPHOID SERUM."**

(From the Bacteriological Laboratory of the Massachusetts General Hospital.)

Pfeiffer has claimed that, in the so-called serum reaction discovered by him, we have an absolutely sure diagnostic test for the bacillus of typhoid fever. This claim is in the main justified by the experience of others, but certain precautions must be observed. I. The serum must not be too concentrated. II. The time of exposure of the culture to the action of the serum must not be unlimited. Otherwise, cultures of colon bacillus, bacillus enteridis of Gärtner, and bacillus of psittacosis, are liable to give confusing pseudo-reactions. The writer experimented with dried

serum. The serum obtained from a typhoid autopsy was poured upon ordinary filter-paper and dried in the air. The paper was then cut up into small pieces, approximately  $\frac{1}{2}$  sq. c. m. in size. The test is applied in the following manner:— $\frac{1}{2}$  sq. c. m. of paper is dropped into ten drops of a 24° bouillon culture of the suspected organism. and, after becoming thoroughly saturated, is left for five minutes only.

In this manner were treated 23 typhoid, 15 colon, 6 pyocyaneus, 1 mouse typhoid, and 1 pyogenes foetidus cultures. Each culture was of absolutely separate origin.

Every typhoid culture showed immediate strong reaction — loss of mobility and clumping together of the organisms. All the other cultures failed to react.

The writer has used the papers for four months now. Their power is still unimpaired, and probably lasts indefinitely.

They are a convenient form for preserving the test for laboratory use.

The reaction was demonstrated before the Society.  
Mr. R. T. ATKINSON spoke on

#### “A PATHOGENIC DIPLOCOCCUS”

which was isolated from a sub-acute inflammation of the testicle, operated on by Dr. A. T. CABOT, and which has been studied under Dr. WRIGHT's direction at the laboratory of the Massachusetts General Hospital.

It is a moderate sized diplococcus, occurring singly and in short chains and having a capsule which is retained after long cultivation on an artificial medium.

It is non-motile and stains readily with the ordinary stains as also by the method of Gram.

It grows best on blood-serum at the body temperature, the growth appearing after twelve hours as a homogeneous, colorless, transparent, moist, elevated streak, resembling in consistency the white of egg.

Individual colonies appear as small, colorless drops of more or less rounded outline, which may attain a diameter of 2 or 3 mm.

The growth on serum agar, sugar agar, plain agar and gelatine is of the same character but less abundant.

On potato the growth appears as a slight moisture not appreciably elevated above the surface.

It turns litmus milk a pinkish color but there is no coagulation.

There is no growth in bouillon.

It does not liquefy gelatine, is facultative aërobic and does not produce gas.

Inoculated into the peritoneal cavity of rabbits and guinea pigs it causes death in a few days from an extensive peritonitis, the exudate of which is abundant, thick, viscid and transparent, with a few yellow flakes.

Inoculated into the ear vein of a rabbit it causes death in nine days.

Inoculated subcutaneously in guinea pigs and white mice it produced an abscess at the seat of inoculation and death after a few days.

The diplococcus was recovered in pure cultures from the organs of all the animals inoculated.

The organism which it more closely resembles is the pneumococcus (*micrococcus lanceolatus*), from which it is to be distinguished by the size and appearance of its colonies, by the absence of growth in bouillon and by its retaining its capsule through many generations of cultivation on artificial media.

Cultures and microscopical preparations were demonstrated.

Dr. B. JOY JEFFRIES spoke upon

**"MENTAL CONTROL OF PROJECTED AFTER IMAGES."**

Our projection may be considered as a cone whose base has the shape of the object from which the after image is obtained. This cone projects indefinitely into space. The size of the projected after image depends upon the distance from the eye the surface on which we project cuts this cone, and the shape, upon the angle at which it cuts it.

Our judgment of the distance and size of the after image, as of all retinal images, depends on accommodative power used, illumination, aerial perspective, and optic axes convergence. This we do unconsciously. In experimenting many years ago I observed that certain after images were not *at once*, and sometimes not at all governed by the surface projected on, and by a little training, the mind could at will allow or not the surface projected on to determine the size and shape of

the after image. Of course success in this depends on how definite or indefinite, so to speak, is the surface in our field of vision. I had at that time some correspondence on this point with Prof. PLATEAU. If there has been any recognition of my point published I have failed to find it, till W. SCHARWIN and A. NOVIZKI, in Moscow, recently reported the same, with similar experience.

I found a white ring on a black surface served best to get the after image from, as its change of shape and size became more marked as also the ability to prevent its change of shape or size. *Colored* rings also serve well, as the complementary color of the after image fixes attention.

Using both eyes to fix the object with, of course gives us a stronger after image, more easily and definitely projected. We get the same, however, from one eye whilst the other is closed, but in less degree.

If we get the after image in one eye, whilst the other is closed, and then close the first eye and open the other, we govern the after image in the closed eye by the surfaces we project on with the open one. This requires a little experience.

The two Russian observers report what I had not noticed, namely, that with the lids closed, we could not affect the size or shape of the after images by any mental suggestion or surfaces at varying distances, even when the thought was assisted by holding, for instance, a sheet of paper, nearer or farther from the eyes and mentally projecting on it, etc.



Dr. E. M. HARTWELL exhibited a

CHAIR DESIGNED BY HIM,

with the aid of Mr. C. W. PARMENTER, Head Master of the Boston Mechanic Arts High School, to facilitate the measurement of school children for the purpose of accurate school seating. The particular chair shown having been made by certain pupils and teachers of the Mechanic Arts High School, and being intended as a model for measuring chairs to be used in certain Boston schools which are provided with adjustable desks and chairs, Dr. HARTWELL proposed to name it the Boston School Measuring Chair. His special purpose in bringing it before the Society was to publicly renounce all possible proprietary rights in the chair and its peculiar structural features, so as to prevent its being copy-righted or patented by anyone, should it prove to be a serviceable anthropometric instrument. The chair is adapted for use in anthropometric laboratories, or for securing the data requisite for prescribing the proper heights of desk and chair and the proper depth of chair in any given case.

The framework of the chair is not adjustable, but it has connected with it certain movable pieces capable of adjustment, namely (1) the seat, (2) the foot-board, (3) the arm-rest, and (4 and 5) two cap-pieces. The seat is placed some 30 inches above the floor to enable the observer to read the metric scales—affixed respectively to the seat, right forward leg, and

right side pillar of the chair-back — without having to crouch inconveniently. The seat is made to slide backwards and forwards, so that its front edge can be brought into contact with the posterior surface of the sitter's leg in the hollow of the knee, when the leg makes a right angle with the thigh in the knee joint. The foot-board, which is of unusual depth, can be raised and lowered within a certain predetermined range. There is a single arm-rest on the right side of the chair—none being placed on the left side—which can be raised and lowered so as to provide a firm support to the under surface of the sitter's forearm when the latter makes a right angle in the elbow-joint with his arm. The movement of the seat is effected and controlled by a double-rack and pinion; so is the movement of the foot-board. A single rack and pinion controls the movement of the arm-rest. There are also two cap-pieces which play up and down in slots in the middle and left side pillars of the chair-back. These cap-pieces which are respectively used in determining sitting and standing height are moved by the observer's hand.

When the occupant of the chair sits erect, having his back against the back of the chair, his feet resting flat upon the foot-board, the posterior surface of his leg (which is flexed at a right-angle to the thigh) being in contact with the front-edge of the seat, his forearm (which is bent upon the arm at a right-angle in the elbow-joint) being supported by the arm-rest, and the

mid-cap piece resting lightly upon his head, the observer has but to note the following distances, shown by pointers above the metric scales, to secure the data requisite for prescribing the dimensions of the seat best adapted to meet the individual needs of the sitter. Those distances are: (1) the distance from the under surface of the cap-piece to the upper surface of the seat, which equals the sitting height; (2) the distance between the upper surfaces of the foot-board and seat, which equals height of knee and *height of seat*; (3) the distance between the front edge of the seat and the back of the chair, *which equals depth of the seat*; and (4) the distance between the upper surfaces of seat and arm rest, which equals the "*Difference*" so called, which difference being added to (2) above (the height of seat), *gives the required height of desk*. The height of desk may be obtained directly by measuring the distance from the upper surface of the adjusted foot-board to the upper surface of the adjusted arm rest. The height of lumbar back-rest is easily determined by noting (on a scale placed on the middle pillar of the chair-back) the height of the lower ribs on the upper border of the pelvis above the surface of the seat.

DR. H. C. ERNST demonstrated cultures and microscopic preparations of the

"BACILLUS OF BUBONIC PLAGUE,"

The originals of which were received from DR. E. H.

**WILSON** of the Hoagland Laboratory, having come to him direct from Yersin, who announced the discovery of the microorganism simultaneously with Kitasto. The disease is of long existence and in years past has attacked the population of Western Europe, the last great epidemic however having been as long ago as 1720.

The symptoms of the attack are sudden onset, after an incubation of from four days and a half to six days, with great feebleness and prostration. High fever suddenly makes its appearance sometimes with delirium. With the first day a single bubo generally makes its appearance, and in 75 per cent of the cases this bubo is situated in the groin; in ten per cent in the axilla; very rarely in the neck or other regions.

The gland very quickly attains the size of a hen's egg; death occurs in about 48 hours and frequently in a shorter time. When life is prolonged past this time, the prognosis is more favorable; the bubo may be opened for the discharge of the pus.

In some cases the bubo does not have time to form; and then there are to be seen only haemorrhages of the mucous membranes or petechial spots on the skin.

The mortality is very great, 95 per cent in hospitals, and 80 per cent in general practice.

It has been observed that before the epidemic makes its appearance among men, it attacks with great severity rabbits, rats, buffalos, and pigs. The glands affected seem to be filled with a mass of short, thick

bacilli with rounded ends, easily stained with the basic aniline colors and not stained by Gram. The ends stain more deeply than the center, so much so that they sometimes show a perfectly clear space in the center; sometimes the bacilli appear to be surrounded with a capsule; they are found in great numbers in the bubos and glands, in much less numbers in the blood, and then only in the extremely severe and rapidly fatal cases.

Cultures on agar show white transparent colonies with iridescent edges by reflected light. The bacillus grows well upon glycerine agar, and also upon blood-serum. Its appearance in bouillon is similar to that of the erysipelas coccus. The best medium for its development is 2 per cent alkaline peptone solution with the addition of 1 to 2 per cent of gelatine. The bacilli often appear in chains and in old cultures there are many degeneration forms that take the stain very poorly. Guinea-pigs, rats, or rabbits die in from one to five days after inoculation with pure cultures, and present the characteristic lesions, enlarged glands, and many bacilli in the glands, spleen and often a few in the blood.

The virulence is increased by passing through animals and is diminished during cultivation on artificial media.

Care must be taken to keep the inoculated animals separated from the well, for it is extremely easy for the disease to pass from one to the other.

YERSIN considers that rats are the principal means of transmission of the disease, but also demonstrated that flies might be the means of carrying the infectious material. He isolated the bacillus from the earth underneath an infected house, after attempts had been made at disinfection.

In his first article (*Ann. de l'Inst. Past.* VIII. p. 662) he suggests the possibility of securing an immunizing serum, and in an article lately published (*Ibid.* XI., p. 81) gives an account of how this has apparently been accomplished. Horses were used for the purpose, and the record of 26 cases is given, with 2 deaths—both of these of the most severe type—a mortality of 7.6 per cent.

(The cultures in Boston have been worked up by DR. J. N. COOLIDGE, and the above abstract is taken mostly from Yersin's articles *Loc. cit.*).

DR. H. C. ERNST showed

**“A SYRINGE FOR THE ADMINISTRATION OF THE  
ANTITOXINE OF DIPHTHERIA.”**

the peculiarity of which consisted in the fact that the piston and rod are a solid cylinder without packing further than a single cork washer that can be easily changed.

DR. H. P. BOWDITCH demonstrated the

**“AUTOMATIC ACTIVITY OF SMOOTH MUSCULAR  
FIBRE.”**

The demonstration consisted of a myographic experiment with three circular strips cut from a frog's stomach ten hours previously, and suspended in a moist chamber. Each strip exhibited characteristic forms of rhythmical contraction.

Dr. E. A. DARLING showed

A SPECIMEN OF FLUID FROM AN AMOEBIC ABSCESS  
OF THE LIVER.

The fluid was pinkish brown in color, of a gelatinous consistency and contained a large amount of albumin. Under the microscope many living amoebae coli were to be seen, together with granular debris and a few leucocytes and red blood corpuscles. No bacteria were present. The case was remarkable as occurring in a patient with no previous history of dysentery. The patient had not been out of the immediate vicinity of Boston for many years and the mode of infection was unknown.

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At the meeting held March 30, 1897,  
Dr. W. T. COUNCILMAN reported

“THE RESULTS OF SOME RECENT EXPERIMENTS  
ON THE CORNEA.”

It may be regarded as established that the new cells which appear in the cornea at an early period of inflammation are leucocytes which come from the vessels of the conjunctiva and find their way into the tissue. They pass into the cornea both from the periphery and from the centre in case the corneal tissue is broken in the production of the initial central injury. The regeneration of the tissue takes place by proliferation and new tissue formation of the corneal corpuscles outside of the area of necrosis produced by the injury. All previous experiments have paid little or no attention to the changes which take place in the conjunctiva or to the varieties of leucocytes which enter into the tissue. It has been generally assumed that the leuco-



cytes which are found in the blood of the rabbit, the animal most used for these experiments, are the same in kind though not in relative numbers as those in man. Examination of the rabbit's blood shows that it contains no leucocytes, similar in character to the neutrophilic cells of man. The majority of the leucocytes in the rabbit are eosinophilic, and two varieties of these may be distinguished, differing from one another in the size and staining power of the granules in the protoplasm. Most of these cells have a very irregular and apparently fragmented nucleus. This may have a horse-shoe, circular or variously irregular shape. The appearance of fragmentation is delusive, the single nuclear pieces are united to one another by fine nuclear filaments. The cell has apparently a distinct membrane and a clear protoplasm which contains fine granules, which stain with eosin. The nucleus stains intensely and is solid. The other eosinophilic cells have larger and more distinct eosinophilic granules, which stain in methods of hardening which leave the granules of the more numerous cells unstained. The next most important variety of leucocytes, which are nearly as numerous as the eosinophilic cells, is of the same size or slightly larger than the eosinophiles. The nucleus is usually centric but may be eccentric, and is large relatively to the size of the cell. The nucleus is vesicular, it does not stain so vividly as the nucleus of the eosinophilic leucocytes. The periphery of the

nucleus is stained intensely, the centre is paler and often contains intensely stained rods and granules. The nucleus is round or irregular, often the shape of a horse-shoe, but is never separated into small fragments. There are also a small number of lymphoid cells, similar to the lymphoid cells in the human blood. The first variety I shall speak of as eosinophilic, the second as non-eosinophilic and the third as lymphoid cells. The normal cornea contains a small number of the non-eosinophilic cells, the conjunctiva both eosinophilic, non-eosinophilic and lymphoid cells. In the conjunctiva the eosinophilic cells are found close beneath the epithelium, the non-eosinophilic cells in the deeper layers, and the lymphoid cells are both scattered irregularly through the tissue and arranged in small masses around the corneal margin.

The methods of investigation consisted in cauterizing the centre of the cornea, both with nitrate of silver and caustic potash and inoculating with a culture of staphylococcus of known virulence. The cornea and conjunctiva were examined after varying intervals of time. Essentially two methods of examination were used. In the first, the entire cornea was silvered while the animal was anaesthetised, then after ten minutes the animal was killed, the tissue thoroughly washed, and exposed for twenty-four hours in a slightly acidulated mixture of glycerine and water to the action of diffuse daylight. It was then cut into serial horizontal sections with the

freezing microtome, stained with haematoxylin and mounted in balsam. This method gives the most beautiful positive and negative pictures of the tissue, both protoplasm and nuclei of the growing corneal corpuscles are stained, and only the nuclei of the others. The nuclei of the emigrating cells stain in haematoxylin and the outlines of the protoplasm in silver. Nuclear figures appear with a distinctness scarcely possible with other methods. Degenerations of the nuclei are distinctly shown. The disadvantage of the method is that neither the granules in the leucocytes nor the bacteria can be shown.

The other method of examination consisted in hardening the tissue in corrosive sublimate or Zenker's fluid and cutting both conjunctiva and cornea into thin flat sections, staining and mounting in balsam. The most satisfactory methods of staining consisted in staining with eosin followed by polychrome methylene blue. The best results were obtained from hardening in Zenker.

After inoculation of the centre of the cornea with the staphylococcus, emigration begins from the vessels of the conjunctiva in two hours and in four is considerable. The eosinophilic cells are the first to come through the vessels. The non-eosinophiles do not appear to emigrate before eight hours. The cells make their way, both into the cornea and through the conjunctival epithelium to the surface. These pass to the

the centre of the cornea and infiltrate the lesion and the surrounding tissues. *Only the eosinophilic cells pass through the conjunctiva and only these are found in the central injury.* The eosinophilic cells are the first to enter into the periphery of the cornea. They travel at will, both in the lymph spaces of the tissue and in the tissue between the bundles of corneal fibres, where they may be drawn out into such fine filaments as to resemble stained fibres. In such cells, the nucleus is always found at the two ends of the cell, the two parts being connected together by a fine nuclear filament, which in some cases is almost invisible. The eosinophilic granules lie in the middle of the cell. Disintegration of these cells is constantly taking place. Small, round masses of protoplasm containing eosinophilic granules, even single granules, become separated from the cells. A string of such particles appearing like the tail of a comet may be seen behind such a travelling cell. Complete disintegration of the cell takes place by fragmentation of the nucleus and protoplasm. In such cases the small, solidly stained nuclear fragments are each surrounded by a small mass of protoplasm. All these cell fragments are taken up, both by the corneal corpuscles and by the non-eosinophilic leucocytes which appear later. This disintegration of the leucocytes is so extensive that a majority fail to reach the central lesion in good shape. The centre of the cornea is not reached by these leucocytes before eight-

een hours. The non-eosinophilic cells do not appear at all in the centre of the cornea and in the periphery come after the eosinophiles. They travel almost exclusively in the lymph spaces and are rarely seen between the corneal bundles. Their emigration is rapid when it begins and they may be found in the conjunctiva in as great or in greater numbers than the eosinophilic cells. All of these leucocytes are found in the outermost layers of the cornea, few or none appear in the deeper layers. The eosinophilic cells also make their way to the surface of the cornea through the epithelium. Emigration takes place first from the vessels of the venous plexus immediately around the cornea, later the vessels of the sclera and the iris take part in it. Around the central lesion the leucocytes are found in the first hours among the bacteria and many of them contain the cocci. Later they form a wall outside of the bacteria. After eighteen hours the central lesion shows in the centre a mass of micrococci in broken and more or less disintegrated corneal tissue; outside of this is a zone of necrotic tissue which contains neither micrococci nor leucocytes; then comes a definite wall of eosinophilic leucocytes, most of which no longer take the eosin stain and which are more or less disintegrated; outside of the leucocytes there is necrotic corneal tissue and then the normal corneal corpuscles which do not show any phenomena of multiplication. Many of the corneal

corpuscles contain fragments of leucocytes, but this is especially evident when they begin to multiply. Then both entire leucocytes and fragments are seen in the majority of the growing cells. Both the leucocytes and fragments within the cells are surrounded by a clear area, similar to a digestive vacuole.

A paper will appear later by Drs. Councilman and Mallory giving the full details of the process. This communication is in the nature of a fragmentary sketch.

DR. E. S. WOOD presented a

**“CONTRIBUTION TO THE DETECTION OF ARSENIC IN  
MEDICO-LEGAL CASES IN WHICH THE CADAVER  
HAS BEEN EMBALMED WITH ARSENICAL SOLU-  
TION.”**

As is well known in cases of this kind the ordinary chemical analysis of the organs is of no value, since it is impossible to say in most instances whether the arsenic isolated by the ordinary processes used in analysis comes from the embalming fluid or from arsenic injected before death.

In such cases the diagnosis of arsenic poisoning can only be made by detecting the presence of white arsenic crystals in the alimentary canal. This is a very easy matter in those cases in which large quantities of solid arsenic have been taken and death has occurred quickly, so that large accumulations of

$\text{As}_2\text{O}_3$  crystals remain in the stomach or intestines. The crystalline masses can then be picked out with forceps, washed with water, and recognized by microscopic examination and chemical tests.

In cases in which only a comparatively few crystals remain adherent to the mucous membranes of the stomach and intestines, and then only in isolated crystals or in such small aggregations that they can not be seen by simple inspection, the isolation and recognition of the crystals becomes extremely difficult, partly on account of the loss entailed by repeated washings by decantation with water, and partly on account of the impossibility of distinguishing between the crystals of  $\text{As}_2\text{O}_3$  and other crystalline substances, such as phosphatic crystals or minute particles of silica or other crystalline mineral matters which may have been taken with food, or have become mixed with the contents after removal from the body in the form of dust.

To avoid these difficulties the following modifications of the usual process have been used with success. First, to use alcohol instead of water in washing by decantation. The arsenic crystals are less soluble in water than in alcohol, and the crystals will sink more rapidly in alcohol than in water. And second, after most of the organized debris has been eliminated by the washing,  $\text{H}_2\text{S}$  is passed through the alcohol with the solid matter in suspension. This covers each crystal of  $\text{As}_2\text{O}_3$  with a yellow coating of sulphide,

which renders the distinction between the  $\text{As}_2\text{O}_3$  crystals and other crystalline substances very positive and comparatively easy by microscopic examination with low powers.

DR. L. FROTHINGHAM, showed the microscopic preparations from and spoke of

“ A REMARKABLE CASE OF TUBERCULOSIS  
IN THE CAT.”

Organs of thoracic and abdominal cavities brought to the laboratory.

*Microscopic Examination:*

*A mesenteric gland* size of pigeon's egg. This was a firm necrotic mass, no gland structure visible. (Cover-glass prep. showed great quantities of t. b.) Two other *mesenteric* glands were enlarged, one size of pea, the other double this size.

*Spleen:* Much enlarged and contained numerous well defined yellowish tubercules varying in size from pin-head to that of double pea.

*Liver:* Embolic mil. tuberculosis.

*Lungs:*     ,,     ,,     ,,

*Kidneys:* Beneath the capsules of each kidney were 2-4 small pin-head tubercles.

Having placed bits of the various organs in hardening fluid, the gross material was put aside for later careful dissection. By some accident it was unfortu-



nately lost, so that it has been impossible to demonstrate the point at which the bacteria entered the blood.

*Microscopic Exam.:*

This was exceedingly interesting for several reasons:

1. In none of the organs were typical microscopic tubercles found, i. e. consisting of epithelioid, giant and lymphoid cells, with or without central necrosis. On the contrary the lesions everywhere, both small and large, were almost purely purulent in character. In the lungs the process was often limited to 2-3 alveoli, the thin walls still distinctly visible. Many of the blood vessels in the *lungs and liver* showed similar purulent lesions about and in their external walls. Sometimes the process seemed to involve all the coats.

2. The great number of tubercle bacilli present in the lesions.

3. The presence of numerous tubercle bacilli in the blood vessels viz.: throughout the *lungs and liver* in the larger vessels as well as in nearly all the capillaries. Often these bacilli were within leucocytes, sometimes in the epithelial cells., e. g., alveolar epithelium, and liver cells.

DR. J. H. WRIGHT showed

“A CULTURE OF THE BACILLUS OF INFLUENZA,”  
obtained from the sputum of a patient in the Massachusetts General Hospital. A cover-glass preparation

showing a leucocyte containing the bacilli was also demonstrated.

During the past winter the bacillus of influenza has been twice isolated from the lung at autopsies in the Laboratory of the Mass. Gen'l Hospital. In both of these cases the organism was accompanied by the *Pneumococcus* or *Micrococcus Lanceolatus*. The lesion in the lung in one case was acute lobar pneumonia, in the other an extensive broncho-pneumonia. The bacillus from these cases was identical with that from the sputum.

It was found to grow only on media containing blood, and agrees completely with the bacillus described by Pfeiffer in 1893. On blood-agar slant cultures, prepared by smearing a small quantity of the blood of the finger (thoroughly cleaned with alcohol and ether) upon ordinary agar-agar "slant" tubes, with the platinum loop, the organism grows in the form of very minute, transparent, water-clear colonies, usually only clearly visible with a hand lens. Under a low magnifying power they are circular in out-line, translucent, not granular, and do not become confluent.

These colonies are made up of very small bacilli, as a rule, quite short, and with rounded ends, but occasionally growing into long forms, which are curved or bent. They exhibit considerable irregularity of staining with the usual anilin dyes, the shorter and usual form being stained deeply at the ends of the rod, while

the central and main portion remains unstained or only faintly colored.

For the staining of cover-glass preparations from the Sputum, Loeffler's Alkaline Methylene Blue solution gives very satisfactory results. The preparation should be heated for a few seconds during the process of staining. The bacillus may be recognized by its small size, its tendency to polar-staining and by its position inside the leucocytes, although it is not always present in these.

For cultures from the sputum a thick, distinctly purulent portion is chosen, washed in a little sterile bouillon to free it of extraneous organisms, and then a small fragment of this is smeared over the surface of a blood-agar slant.

The colonies appear after eighteen hours in the incubator. The use of blood-agar tubes for cultures at autopsies is not necessary, owing to the fact that sufficient blood may be smeared over the surface of the tube with the material from the tissue to enable the bacillus to grow. Succeeding generations may then be cultivated on the blood-agar.

DR. W. F. WHITNEY spoke on

I. "DOUBLE STAINING OF FRESH TISSUE."

The differentiation of the cellular elements and the connective tissues in sections of fresh tissue can be brought out by the following stains:

1. Carbol Fuchsine . . . . . 1 c. c.  
 Strong Aq. Sol. Methyl Green, 1 c. c.  
 Aq. . . . . 20 c. c.

Sections made on the freezing microtome are placed in the above 10 to 30 secs., then washed in distilled water and mounted in glycerine. Epithelium and aggregations of cells stain a vivid green, fibrous connective tissue a very pale pink, elastic tissue a deep red. Especially useful in study of the blood vessels, skin and lung tissue.

2. 1% Aq. Sol. Acid Fuchsine - 1 c. c.  
 Strong Aq. Sol. Methyl Green, 1 c. c.  
 Aq. . . . . 20 c. c.

Sections made as above can be stained for the same length of time in this solution. Then placed for one minute in a very weak solution of alum (2 drops of a sat. sol. in a watch glass of water). Then washed in water and mounted in glycerine. The alum acts as a mordant, fixing the fuchsine in the fibrous connective tissue, which is brought out in vivid contrast to the more cellular parts. Especially useful in the study of new growths, tubercles, skin and viscera.

The above act best with perfectly fresh tissues, but can also be used on sections of tissues hardened in:

Müller's Fluid, 90  
 Formaline, 10

for 24 hours, and then frozen and cut.

## II. "KAISERLING'S METHOD FOR THE PRESERVATION OF SPECIMENS WITH THEIR NATURAL COLORS."

Slices of organs from 3-5 cms. thick are placed from 3-5 days in :

1. Formaline . . . 200 c. c.
- Aq. . . . 1000 c. c.
- Nitrate of Potash, 15 grm.
- Acetate of Potash, 30 grm.

They are then removed, the fluid allowed to drain off and placed in :

2. Alcohol 80% for 6 hours, then  
" 95% for 2 hours.

From this directly into

3. Aq. . . . . 2000
- Acetate of Potash, . 200
- Glycerine . . . 400

for permanent preservation in a dark place.

Further details for the preservation of whole organs, etc., should be studied in the original article (C. Kaiserling, Virch. Arch. Bd. 147s. 389).

The results thus obtained are certainly wonderful and promise to be one of the greatest aids to teaching of this generation.

DR. W. T. PORTER presented the following observations on the Mammalian heart :

- I. ON THE CAUSE OF THE HEART BEAT.
- II. THE RECOVERY OF THE HEART FROM FIBRILLARY CONTRACTIONS.
- III. NOTE ON THE RELATION BETWEEN THE BEAT OF THE VENTRICLE AND THE FLOW OF BLOOD THROUGH THE CORONARY ARTERIES.

By W. T. PORTER.

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I. ON THE CAUSE OF THE HEART BEAT.

The methods employed by Wooldridge and Tigerstedt to isolate the ventricles from the auricles were incomplete, in that a part of the auricles containing nerve cells was left attached to the ventricles. The ligature used by Wooldridge and the atriotome employed by Tigerstedt cannot be applied in such a way as to entirely separate the auricles from the ventricles without compressing the coronary vessels in the auriculo-ventricular furrow, and thus interrupting the blood supply on which the continued action of the ventricles depends. The beat of the partially isolated ventricle of Wooldridge and Tigerstedt may therefore have been due to the discharge of motor impulses by the cells in the part of the auricles which, in their preparations, still remained attached to the ventricles.

The following experiment illustrates a method which secures for the first time, so far as I am aware, the complete isolation of the mammalian ventricle.

*Experiment of March 27, 1897.*

A dog weighing 10 kilog, anæsthetized with morphia and ether, was bled from the left carotid artery, and the blood whipped, strained through glass wool, and diluted with an equal volume of 0.8 % normal saline solution. Normal saline of the same strength was meanwhile allowed to flow into the right jugular vein. After a short interval, the dog was again bled from the carotid artery. A second injection of saline solution was followed by a third bleeding. The product of these bleedings was mixed, and placed in a reservoir at the temperature of the body. The heart was now extirpated, a cannula tied into the ramus descendens of the left coronary artery, the interventricular septum and the auricles completely cut away, and all the ventricle removed except that portion supplied by the descendens itself. The cannula was then connected to a reservoir of warm blood-mixture, and the piece of ventricle perfused with the blood at a constant pressure, which, to begin with, was about 30 mm. Hg., but which was afterwards raised to 90 mm. Hg. The blood entering the cannula was bright arterial red. That emerging by the coronary vein was venous blue. In a few moments, the ventricle began to beat with

great vigor, shortening about seven millimeters in vertical diameter. An ordinary muscle lever magnifying 8 times, and weighted with 40 grammes, was fastened to a hook thrust through the apex, and recorded curves about 50 mm. in height. The curve showed some irregularity both in force and frequency. The ventricle beat more rapidly when surrounded with blood at the temperature of the body than at room temperature, but the character of the contraction remained unchanged.

At 1 P. M., after writing curves for one hour, the ventricle was thrown into strong fibrillary contractions by stroking its surface with the electrodes of a Du Bois-Reymond induction coil, (tetanic stimulation). Five minutes later, good co-ordinated contractions returned. Forty minutes thereafter, the ventricle was thrown a second time into fibrillary contractions, from which it soon recovered.

Two and three-quarter hours after the ventricle began to beat, the experiment was broken off. The contractions were by this time very feeble, but still unmistakably co-ordinated.

Other experiments have shown that the right ventricle and the remaining portions of the left ventricle, namely, the septum and the circumflex area, will also beat if fed with blood through the coronary arteries.

It follows from these experiments that: (1) *The cause of the rhythmic contraction of the ventricle*



*lies within the ventricle itself. (2) The cause of the rhythmic contraction is not a single localized co-ordination centre. The co-ordination mechanism, whatever it may be, is present in all parts of the ventricle. (3) The integrity of the whole ventricle is not essential to the co-ordinated contraction of a part of the ventricle.*

It follows also that fibrillary contractions of the ventricle are not fatal. A summary of my experiments on recovery from fibrillary contractions will be given presently under a separate title.

I pass now to a refutation of the observation which is the chief reliance of those who believe that the heart beat is maintained by discharges from nerve cells, the observation, namely, that the apical half of the ventricle, even in the frog, does not beat spontaneously after its separation from the basal half.

#### *Experiment of March 29, 1897.*

The heart of a dog prepared as in the experiment of March 27th, was cut out, and a cannula tied into the ramus descendens of the left coronary artery not far from the apex of the left ventricle. That part of the apex which could be fed through the cannula was then excised. Both apex and basal portion fibrillated. The septum was removed. The piece of ventricle secured was 28 mm. in length (i. e. the direction

from the base to the apex), 23 mm. broad opposite the end of the cannula, and 27 mm. broad at the somewhat flattened tip of the apex. The ventricle measured from base to apex 70 mm. The part cut out was, therefore, the part which all observers, (except Berkley) believe to be lacking in nerve cells. The cannula was now connected with the blood reservoir and the apex perfused with blood. In a few moments regular and strong contractions set in. Curves were recorded with an ordinary muscle lever. During systole more blood escaped from the veins than during diastole. The experiment was stopped after the apex had contracted one hour and forty minutes. During a part of this time the preparation was in a bath of blood at the temperature of the body.

The experiment demonstrates that *the "apex" of the mammalian heart possesses rhythmic contractility*. Further, assuming that the general belief in the absence of nerve cells from the apical half of the ventricle is correct, the experiment demonstrates that *the rhythmic coordinated contraction of the ventricle is not dependent on nerve cells*.

## II. THE RECOVERY OF THE HEART FROM FIBRILLARY CONTRACTIONS.

In experiments described in the previous communication ("On the Cause of the Heart Beat"), mention is made of the recovery of the dog's ventricle from

fibrillary contractions. The probability that the dog's ventricle would thus recover when supplied with blood was pointed out by me in earlier papers (*Centralblatt fur Physiologie and Journal of Experimental Medicine.*)

Fibrillary contractions have been seen in part of the ventricle, while other parts of the same ventricle were giving rhythmic, coordinated contractions.

The fact that the isolated apex and other isolated parts of the dog's ventricle will fibrillate, shows (1) that fibrillation is not caused by the stimulation of a localized centre for the coordination of the whole ventricle; and (2) that fibrillary contractions do not require nerve cells for their production, it being assumed that the general belief in the absence of nerve cells from the "apex" of the ventricle is correct.

### III. NOTE ON THE RELATION BETWEEN THE BEAT OF THE VENTRICLE AND THE FLOW OF BLOOD THROUGH THE CORONARY ARTERIES.

At the meeting of the American Physiological Society in Boston, December 29, 1896, I pointed out that the isolated heart of the cat takes more blood through the coronary arteries from a reservoir under constant pressure when contracting than when at rest. The same fact was noted afterwards by Langendorff. When an isolated piece of dog's ventricle is fed through its coronary artery, the flow from the veins is seen to

be greater during systole than during diastole. On March 30, 1897, after having observed this phenomenon in several ventricles, I tied a cannula into the principal vein of a piece of the dog's ventricle consisting of the area supplied by the ramus descendens of the left coronary artery, the right ventricle and septum having been cut away except a narrow fringe near the descendens. The blood was clearly driven out of the cannula in the vein with each systole of the ventricle. The extent to which this pumping action of the ventricle influences the circulation through its walls and the form of the ventricular cavity during diastole is now being studied.

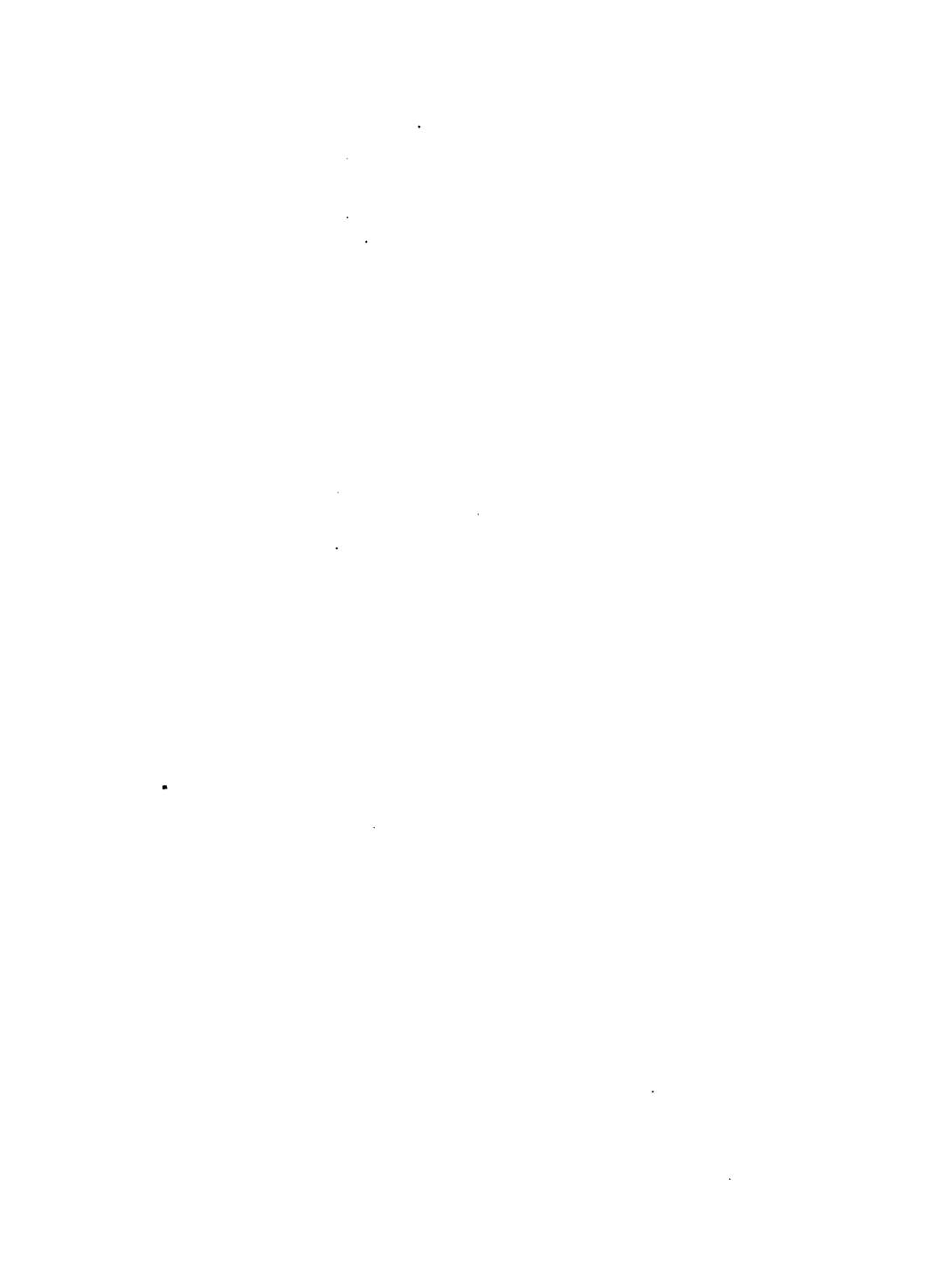
DR. H. C. ERNST showed a recent form of

“PRESSURE FILTER”

for the sterilization of fluids at ordinary temperatures, consisting of a Chamberland filter, a copper reservoir in one piece, able to resist a pressure of thirty-five atmospheres, and a Gay-Lussac pump.







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(*Correction.* In number 10 of the Journal, page 7,  
l. 21, for "injected" read "ingested;" page 8,  
l. 25, for "water in alcohol" read "alcohol in  
water.")

At the meeting held April 13th, 1897, Dr. E. A.  
CODMAN reported studies upon

"THE APPLICATION OF THE RÖNTGEN RAYS  
TO THE STUDY OF ANATOMY."

The radiographs to be shown illustrate the results of some experiments undertaken with the aid of the Bullard Fellowship, with the object of finding some of the new points in the study of Anatomy, which are brought out by the use of the X-rays.

Röntgen pictures are distorted in two ways; first, by the magnification of all parts of the object not in contact with the plate; second, by the elongation of the shadows of those parts of the object which are distant from the base of a perpendicular from the point of light to the plate.



This elongation increases with the increase of the distance of the part from the base of this perpendicular and takes place in the direction of the part from the base of the perpendicular.

In taking a picture the wider or deeper the object the greater should be the distance from the point of light.

The less the intensity of the light or the greater the distance of the plate, the longer should be the exposure.

The part of the object particularly to be studied should be as near the plate as possible.

These investigations have been directed chiefly to the study of the mechanism of the joints of the limbs, both by study with the fluoroscope and by radiographs taken in the extreme positions,—as flexion, adduction, etc., and include,

The mechanism of the wrist with a description of the movements of the carpal bones :

The Elbow,  
The Foot and Ankle,  
The Knee,  
The Hip and Shoulder.

Illustrations with lantern slides of these movements. Also lantern slides showing arterial injections; the heart and pulmonary veins in situ; injections of joint capsules with mercury and plumbic nitrate.

Stereoscopic pictures showing how the distortions previously spoken of may be corrected.

DR. THOMAS DWIGHT presented photographs of the Ear, Hand, and Foot of a young

“CHIMPANZEE,”

demonstrating certain relationships to, and differences from the similar parts in a human being.

DR. H. F. HEWES spoke on

“SOME RESULTS FROM AN INVESTIGATION OF THE  
NORMAL GASTRIC DIGESTION”

for application to Clinical Work.

The investigation consists of the physical and chemical examination of the gastric contents obtained from fifty healthy individuals.

The subjects of the investigation were men, between the ages of 17 and 30,—students at the Harvard Medical School.

Such subjects only were utilized as were apparently in perfect health—both as regards the gastric functions and otherwise.

Each man took an “Ewald” test breakfast consisting of one roll, weighing about 35 grms., and 300 cc. of water, after a 12-hour fast.

One hour after ingestion the stomach tube was passed and the gastric contents expressed by the expression method of Ewald.

These contents were then subjected to the following determinations in each case:

The total quantity of the mixed contents.

The total quantity of the filtrate.

The presence of free hydrochloric acid,—lactic

acid,—butyric acid,—and acetic acid.

The presence of starch and dextrin.

The presence of albumin,—acid albumin,—albumoses, and peptones.

The total acidity.

The total free hydrochloric acid.

The total combined hydrochloric acid.

The total organic acids, and the total acid salts.

(These quantitative estimations were made upon both the mixed contents and the filtrate).

The digestive power of the filtrate upon coagulated egg albumin.

All these determinations were made by methods suitable to clinical work.

The results in regard to two of these subjects of investigation differ markedly from all results heretofore reported upon these subjects.

These are

1. The total quantity of the gastric contents.
2. The condition of the carbohydrate digestion in the stomach.

The total quantity of the gastric contents expressed one hour after the ingestion of an Ewald test breakfast from the normal stomach is placed by most writers on the subject of gastric disease as lying between 25 and 60 cc. (vide Rosenheim,—Leo,—Hammerschlag,—Pepper).

I have been unable to find any report of any definite sets of observations to serve as a basis for this generally accepted statement.

These writers say further, that a quantity of expressed contents of over 100 cc. in a given case is suggestive of some affection of the motility of the stomach or of stenosis of the pylorus.

Boas states in his text book that the total quantity of the filtrate upon the contents obtained one hour after the Ewald breakfast averages 40 cc. in the normal stomach. The normal limits of variation he places as 15 cc. each way.

He gives as the basis of his statement the results of the investigation of eight cases.

The results in the fifty cases which I have investigated are as follows :

The total quantity of the mixed contents expressed one hour after the Ewald test breakfast averaged 110 cc.

The minimum amount was 35 cc.

The maximum amount was 205 cc.

25 cases showed a quantity of over 100 cc.

The total quantity of the filtrate averaged 66 cc.

The minimum was 20 cc. The maximum, 140 cc.

Eight cases showed a total filtrate of 100cc. or more.

These results differ considerably from those of Boas and from the statements of the other writers upon the subject.

They increase the limits of the normal variation and definitely contradict the conclusion that a total quantity, or even a total filtrate of the gastric contents of over 100 cc. is indicative or suggestive of some pathological condition.

Two facts of importance must be borne in mind in

instituting a comparison of these results with those of Boas and the other German writers.

First, that my results were obtained exclusively in young men, while the results quoted were presumably average results of all ages and both sexes.

Second, that the stomachs of my subjects were accustomed to provide for a hearty American breakfast, while the stomach of the inhabitant of continental Europe is accustomed to a much lighter meal.

These facts may in some measure account for the discrepancy in the two sets of results. They do not however in any degree affect the justness of our new conclusions.

In regard to the condition of carbohydrate digestion in the normal stomach, the conclusion given by Ewald in his text book is confirmed or acquiesced in, in practically all the text books on the subject. Ewald's conclusion is that in the filtrate of the gastric contents expressed one hour after the Ewald test breakfast from the normal stomach, the starch is all transformed to achro-dextrin.

The presence of a blue color with the Iodine test (starch) or a purple color (erethro-dextrin) he considers indicative of hyperacidity of the contents.

In the fifty cases which I investigated, starch was present in the filtrate in 6 cases, erethro-dextrin in 15 cases, achro-dextrin in 27 cases.

The evidence of these results warrants the conclusion that erethro-dextrin or even starch may be present in the filtrate of the contents of the normal stomach,

one hour after the Ewald test breakfast.

DR. F. S. LOCKE made a statement of certain results

“TOWARDS THE ‘DISCHARGE HYPOTHESIS’ OF  
MUSCLE BY NERVE.”

The replacement by mere contact of the continuity formerly believed generally to exist between irritable structures would seem to necessitate more attention being given to the modified “discharge hypothesis,” on which Kühne has especially insisted; namely, that the motor nerve-fibre stimulates the muscle-fibre by means of its action current, which acts as an electric stimulus. The author’s experimental results favour the view that the so-called latent period of the motor nerve-endings, which has been held by Bernstein and others to be crucial against the hypothesis, may be due to the nature of the electric stimulation by the action current. It was found that if two curarised sartorius muscles were locally pressed together in the way Kühne has described, and one of them was stimulated with an induction shock above the press, the latent periods of the parts of the muscles below the press were not equal, but that that of the indirectly stimulated muscle was the longer by .003 sec. or more, a time longer than can by any possibility be interpreted as the latent period of the action current.

Another argument against the “discharge hypothesis” might conceivably be founded on the supposed easy exhaustibility of the motor nerve-endings. It

was found, however, that if the curarised sartorius be continuously tetanised by make and break shocks through one pair of electrodes, till "exhaustion" is complete or nearly so, then sending the tetanising shocks through another pair of electrodes situated on different points of the muscles gives again good tetanus. This result was obtained with metallic and unpolarisable electrodes, with the ordinary interrupted current, Helmholtz's modification, and Bernstein's modification, and with all strengths of stimulation. "Exhaustion" in consequence of electric tetanisation is, therefore, primarily polar, and the results that have been supposed to demonstrate the exhaustibility of motor nerve-endings are readily reconcilable with the "discharge hypothesis,"—local "exhaustion" of the muscle substance immediately in contact with the nerve-endings replacing fatigue of these themselves.

The "discharge hypothesis" affords a new conception of the real nature of inhibition and one accounting for the actual properties of inhibited muscle. The anelectrotonus of the muscle substance, which must necessarily accompany the more active katelectrotonus even in the case of the action current of the motor nerve-ending, may not inconceivably become by greater anodic current density the more active in the case of the action current of inhibitory nerve-endings, and be the essential factor in the production of inhibition.

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At the meeting held April 20th, 1897, DR. F. B. MALLORY gave

I.—A DIFFERENTIAL STAIN FOR AMOEBAE COLI.

The nuclei of amoebae do not stain with ordinary basic stains, such as methylene blue and alum haematoxylin. By the following method a differential stain of the nuclei is obtained, so that the amoebae can be readily recognized:—

1. Harden tissues in alcohol.
2. Stain sections in a saturated aqueous solution of thionin for 5 — 15 minutes.
3. Wash in water.
4. Differentiate in a 2 per cent solution of oxalic acid for  $\frac{1}{2}$  — 1 minute.
5. Dehydrate in alcohol.
6. Clear in oleum origani cretici, or directly in xylol if absolute alcohol be used.
7. Xylol balsam.



The nuclei of amoebae and the protoplasmic granules of mastzellen are stained brownish red; the nuclei of mastzellen and of all other cells are stained blue.

A similar differential stain can be obtained by the method advised by Unna for staining differentially the granules of mastzellen.

1. Harden tissues in alcohol.
2. Stain sections in Unna's polychrome methylene blue solution for 15 minutes to several hours.
3. Decolorize in a small dish of water to which are added a few drops of glycerine—ether mixture.
4. Wash thoroughly in water.
5. Alcohol.
6. Oil of bergamot.
7. Xylol balsam.

Only fair results were obtained by the first method with hardened faeces containing amoebae, because many substances in the faeces precipitate the thionin in the form of fine red crystals,—Unna's method may prove better.

## II.—PHOSPHOTUNGSTIC ACID HAEMATOXYLIN.

Phosphotungstic acid (Merck) 1 per cent

aqueous solution        -        -        -        100. cc.

Haematoxylin            -        -        -        0.1 gm.

Dissolve the haematoxylin in a little hot water, and add when cool to the dilute acid. The solution

changes in a few minutes from a greenish to a brownish color of slight intensity but of considerable opacity. The solution is ripe at once and keeps well without a preservative for several months. It stains slowly, requiring from 1 — 24 hours according to the fixative used and the tissue element to be stained.

Directions for staining :—

- 1.—Stain sections 1 — 24 hours.
- 2.—Wash in water.
- 3.—Alcohol (not over 3 — 5 minutes.)
- 4.—*Oleum origani cretici*.
- 5.—Balsam.

The solution possesses the property of being polychromic. Connective tissue fibres, and the ground substance of cartilage, bone, and of the cornea are stained a light to dark pink after various fixing reagents, of which alcohol and Zenker's fluid have been found the most generally useful. The pink color is readily extracted by alcohol so that prolonged treatment with it must be avoided. Nuclei are stained a deep, clear blue. The protoplasm is stained a light blue, if staining be prolonged. The contractile elements of striated muscle fibres stain intensely and quickly after hardening in alcohol, less well after other fixatives. Fibrin stains readily after hardening in alcohol or Zenker's fluid. Elastic fibres stain sharply in the course of 24 hours in preparations hardened in alcohol, less well after fixation in Zenker's fluid. Celloidin remains unstained. The solution is useful for the

central nervous system of man after fixation in the following way:—

- 1.—Fix perfectly fresh tissue in a 4 per cent aqueous solution of formaldehyde (.0 per cent solution of formaline) for 4 days or longer.
- 2.—Place in a saturated aqueous solution of picric acid for 4 days or more.
- 3.—Transfer to a 5 per cent solution of bichromate of ammonium for 4 to 6 days in the incubator at 37° C., or for 4—6 weeks at room temperature.
- 4.—Harden directly in alcohol. Imbed in celloidin.
- 5.—Stain sections in phosphotungstic acid haematoxylin for 12—18 hours.

Neuroglia fibres when properly fixed stain deep blue,—otherwise pink,—elastic fibres of the pia blue, nuclei blue, protoplasm and dendritic processes of ganglion cells purplish, or bluish gray, connective tissue deep pink, axis cylinders light pink, myelin sheaths yellow (from chrome salt.) The axis cylinders and the ganglion cells with their dendritic processes can be brought out in greater contrast if the sections be first stained very lightly in Van Gieson's picro acid fuchsin mixture. The best results are obtained with nerve tissue placed in the fixing fluid within one hour after death. From tissues not fixed until twelve hours or more after death but little can be expected.

DR. THEOBALD SMITH spoke upon  
THE DESTRUCTION OF DIPHTHERIA TOXIN BY OTHER  
PRODUCTS OF THE DIPHTHERIA BACILLUS.

The question as to what factor or factors are responsible for the feeble accumulation of toxin in bouillon cultures containing more than 0.05 to 0.1 per cent dextrose (muscle sugar) has not been satisfactorily answered. Is it the partial inhibition of growth due to the formation of acids which limits its accumulation; is it the acid which destroys it, or is it the metabolic activity of the diphtheria bacillus modified by the presence of dextrose in virtue of which the toxin either remains unformed or is consumed after formation? One phase of the problem was approached in the following way:

Toxin was permitted to accumulate in bouillon under the most favorable conditions until further growth was checked by the advancing alkalinity. A portion of the fluid having been withdrawn to gauge its strength on guinea-pigs, enough of a sterile dextrose solution was added to make a one per cent solution. Growth at once began again but was checked in a few days by the rapid accumulation of acids. Six days after the addition of the dextrose, 50 times the original fatal dose had no effect on guinea-pigs. On the seventh day the bacilli themselves were all dead. Here we have an instance of the self sterilization of the culture accompanied by a destruction of the toxin. Several questions present themselves at this point.

Is the toxin fully or partially restored by neutralizing the acids, as claimed by Roux and Yersin? Two trials showed that when the original alkalinity of the bouillon was restored it was still harmless.

Is the toxin destroyed by the acids in the above experiment? Roux and Yersin stated that acids are destructive. Brieger and Fränkel stated that the toxin could be concentrated without loss in an excess of HCl. Recently Brieger states that acids are inimical. The final acidity of the dextrose bouillon in which the bacilli themselves are responsible for the destruction of the toxin varies slightly for cultures from different sources but is approximately equivalent to 4.5 per cent of a normal solution of acid. To test this matter I tried, a year ago, an acidity of 3.3 per cent (using lactic acid) but failed to find any diminution in the toxic power of the acidified culture filtrate after a sojourn of 13 days in the thermostat. Recently I tried the total acidity produced by the diphtheria bacilli when sugar is abundant, namely 4.5 per cent. The germ-free filtrate of the bouillon culture carefully standardized as to its toxicity received in one case lactic in the other chlorhydric acid. The total acidity was for the filtrate containing lactic acid 4.4 per cent normal acid; for the filtrate containing HCl, 4.47 per cent normal acid.\*

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\*Phenolphthalein and  $\frac{N}{20}$  normal NaHO used in all cases.

After 18 hours in thermostat both fluids had lost 50 per cent of toxin; after 3 days in thermostat both fluids had lost over 80 per cent of toxin; after 6 days in thermostat both fluids had lost over 95 per cent of toxin.

In other words 25 times the minimum fatal dose produced only local œdema and slough, the lactic acid manifesting at this time the more destructive effect on the toxin.

The amount of acid needed to eventually destroy the toxin and the bacilli is probably identical with the amount which the bacilli are capable of accumulating before succumbing to it. This, in terms of HCl, would be equivalent to 0.164 per cent if we take 4.5 per cent normal acid as the average. This experiment thus indicates that the acid formed in the 1 per cent dextrose bouillon is responsible for the destruction of toxin.

Does the destroyed toxin possess any antitoxic properties similar to the electrolyzed toxins of Smirnow?

Active, carefully standardized toxin was mixed with the destroyed toxin, now 18 days old and kept in a cold, dark place, before injection into guinea-pigs. The results were as follows: (Control) 2cc. sterile bouillon was capable of neutralizing a trifle less than the unit fatal dose when two units were injected with it; 2cc. of the destroyed toxin was capable of neutralizing a trifle more than the unit fatal dose in precisely the same conditions. The antitoxic power was thus a trifle more than that of sterile bouillon.

From these observations we may conclude that in ordinary beef broth cultures the toxin is probably not destroyed by the acidity as this rarely rises above 3 per cent. The restraining influences must be sought in the inhibitory effect of the acids on multiplication, and what is more than likely, in some still undetermined influence of the sugar on the resulting acids upon the metabolic process of the bacillus. This problem is now receiving attention.

DR. E. W. TAYLOR showed

#### FOUR DEFECTIVE BRAINS

These brains were all taken from persons who showed more or less unmistakable signs of insufficient mental development. The exact determination of mental deficiency was, in certain of the cases, difficult, owing to the extreme youth of the patients. The brains show marked alteration in gross structure, to which fact we desire now to call special attention, rather than to the more fundamental microscopical alterations, which it is hoped may form part of a completer piece of work to follow this preliminary report.

Case 1.—Brain of a young child from Infants' Hospital, supposed to have suffered a skull fracture of the frontal region. Operation; death. The brain presents a remarkably symmetrical bilateral agenesis of the frontal lobes, of the type of microgyri. The remainder of the brain macroscopically, is essentially

normal. Of particular interest is the sharp line of demarcation between the atrophied and the normal convolutions, suggesting an intra-uterine affection of the anterior and part of the middle cerebral arteries, as the cause of the mal-development. The resemblance of this brain to that of the higher apes is exceedingly striking.

Case 2.—Brain of a microcephalic idiot of twenty, who had neither spoken nor walked during his life. The specimen shows a defective development of both hemispheres, but chiefly of the left. Microgyri were marked in the occipital region. Fissure of Rolando, and general arrangement of the convolutions entirely anomalous. Of chief interest is the extreme thinning of the hemisphere wall in both parieto-occipital regions, again most markedly in the left, with a consequent dilatation of the posterior horns of the lateral ventricles. The brain does not cover the cerebellum which is well developed.

Case 3.—Brain of an infant of approximately eight months, from Infants' Hospital. Clinically, showed signs of defective mental development, associated with frequent convulsive seizures of peculiar character.

Autopsy showed a brain practically non-convoluted, a condition which we believe to be of most extreme rarity. There are no marked gross defects in this case; the cerebellum is well covered by the hemispheres and the Island of Reil is not exposed. Apart from the Fissure of Sylvius, which naturally must be



present, and the first temporal sulcus, there are no fissures nor sulci whatever in the convexities of the brain, except a few shallow and anomalous furrows. Fissure of Rolando is absolutely lacking. The brain has the general appearance of being covered with plaster. The mesial aspect of the hemispheres is slightly fissured, as is the base. Cerebellum and brainstem are normal in appearance.

Case 4.—Brain of a child of two years, from Infants' Hospital. Marked mental defects. Operation of craniectomy; repeated; death after second operation.

The specimen is also one of great rarity, though not so unusual as the one preceding. There is complete absence of both cerebral hemispheres, with the exception of imperfect occipital lobes, and a small portion of the temporal lobes. Central ganglia are present, the optic thalami poorly developed. Cerebellum well formed and of normal size. Pons small, agenesis of pyramidal tracts in medulla oblongata.

DR. J. H. WRIGHT demonstrated

“AN UNUSUAL DEGENERATION OF THE SPINAL CORD,”  
in which there was a well marked tract of ascending degeneration in one of the columns of Burdach. This tract of degeneration was associated with a completely degenerated posterior root of one of the lower lumbar nerves. The specimens came from a case of metastatic carcinoma of the mamma involving the spinal

column and sacrum, which was autopsied in the Laboratory of the Massachusetts General Hospital. The degeneration of the posterior root was apparently due to its involvement in the carcinomatous growth of the sacrum.

The tract of degeneration in the posterior column could be traced upward to the neighborhood of the 8th dorsal nerve root, where the cord was pressed upon by the carcinomatous involvement of the vertebral column and where diffuse degenerative changes were present.

There was no evidence of any distinct extension of the degeneration downward in the posterior column, below the entrance of the degenerated nerve.

DR. W. T. PORTER showed

“A NEW FORM OF GASTRIC CANULA.”

differing markedly from the older forms in convenience and accuracy of results obtained with it.



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At the meeting held April 27, 1897, DR. W. T. COUNCILMAN presented an abstract of a paper to be read before the Association of American Physicians in Washington, May, 1897, on

“EPIDEMIC CEREBRO-SPINAL MENINGITIS.”

In 1886 Weichselbaum described, in six cases of epidemic cerebro-spinal meningitis, an organism which appeared in the form of a diplococcus, always within the cells, and which decolorized by Gram. He gave to it the name of diplococcus intracellularis meningitidis. He grew it in pure culture and found that it developed only at thermostat temperatures and best on agar. He inoculated mice, rabbits and dogs with pure cultures of the organisms so obtained. The animals died at periods varying from two to four days, and he found a fibrinous exudation in the serous cavity inoculated. Subcutaneous inoculations with the organism were without effect. These observations of Weichselbaum were

confirmed by single observers, but on the whole little attention was paid to them until 1895, when Jaeger, in an investigation of twelve cases of the epidemic form of the disease occurring in the barracks at Stuttgart, confirmed them, although he did not add anything new to his description. Since then there have been several other observations in Germany in which this organism has been found.

Up to that time the bacterium which had been most frequently described and associated with the disease, was the *diplococcus lanceolatus*. This has been found in cases accompanied by pneumonia and endocarditis, due to the same organism; in cases without pneumonia, apparently due to primary infection of the meninges; and in cases in which the meningitis has followed disease of the middle ear. It has also been described as the causative agent in the epidemic form of the disease.

In this country Flexner and Barker, in 1894, investigated an epidemic of cerebro-spinal meningitis in Laoccoing, in Maryland, and in two autopsies they described the finding of the pneumococcus. In only one of the cultures made from one autopsy was the organism found, but they succeeded in finding it in the tissues of both. The inoculations made on animals were negative. The description of the lesions given by Flexner and Barker and the results of the animal inoculations and cultures would speak rather in favor

of the organism found being the micrococcus intracellularis, but they state distinctly that in the tissues were found lancet shaped diplococci, which stained with Gram, which would establish them as the pneumococcus.

In a recent epidemic of cerebro-spinal meningitis in Boston, the diplococcus of Weichselbaum has been found in nearly all cases. In nine out of twelve autopsies, made on the disease, it has been seen either in cover-slips, in cultures, or sections, and usually in all.

There is little to be added to the description as given by Weichselbaum. We have found it to grow best on blood serum. The growth appears on this after 24 hours in the shape of moist, rather viscid, grayish, opaque colonies, slightly elevated above the surface. One peculiarity is the presence of many apparently dead bacteria which will not grow on the culture media. Even when microscopic examination of cover-slips showed them present in large numbers only single colonies appeared on the blood serum. Microscopic examination of the culture shows organisms varying considerably in size almost always arranged in the form of diplococci or tetrads; occasionally chains consisting of 3 to 6 cocci are found.

We have not been able to confirm the observation of Jaeger that the organism could grow out into comparatively long chains, simulating streptococci. The

examination of the cultures shows also a great variety in staining; some stain clearly with methylene blue; others are swollen and stain imperfectly. Both in the tissues and cover-slips they are completely decolorized by Gram. In bouillon they do not grow with the same facility as on blood serum, and in order to produce a growth it is necessary to inoculate a large amount.

Dr. Wright, at the Massachusetts General Hospital, has found that in bouillon a scanty greyish sediment is formed, which rises in the form of a viscid string, when the test-tube is shaken.

The diplococcus has been found pure in most cases, in others it has been associated with the pneumococcus and with a streptococcus. The lesions found at autopsy differed but slightly in the different cases. The exudation is found in the pia arachnoid of the convexity of the brain along the course of the vessels, and in greatest amount in the sulci. There is usually more at the base of the brain than anywhere else, and here it is often found to follow along the cerebral nerves extending even into the foramina. In all cases the cord has been also involved. In the cord the exudation is chiefly along the posterior surface. The exudation in the brain is always in the meshes of the pia-arachnoid and not on the surface. In the cord it is frequently found free in the sub-dural space lying on the surface of the pia. Microscopically the exudation

consists chiefly of pus cells and fibrin. The fibrin though present is never in the same amount as in cases of pneumococcus meningitis. Where the exudation is extremely thick the fibrin is often swollen up and forms hyaline masses. The diplococcus is almost exclusively found in the pus cells. They occur in greater numbers in the exudation in the cord than in the brain. A few are found outside of the pus cells, their presence here being probably due to the breaking down of the cells containing them. In the exudation there are always found large swollen cells with a vesicular nucleus. Many of these contain leucocytes showing more or less degeneration, which lie in a vacuole in the cell. Among these large cells there are very large protoplasmic masses, many of which are as large as the giant cells in tuberculosis, filled with granular material and nuclear detritus. These large cells result from the proliferation of the endothelial cells of the lymph spaces in which nuclear figures have been found. The diplococci have never been found either in these large cells or in the leucocytes which they contain. In a few cases, foci of purulent infiltration and haemorrhage have been seen in the tissues, both of the brain and cord. The organisms have in general occurred only in the lesions of the disease. There is no septicaemia. Dr. Wright found them once in foci of broncho pneumonia in the lungs and in the nasal sinuses. The other lesions are entirely secondary. Enlarge-



ment of the spleen is frequently present, but does not reach a high degree. Broncho pneumonia has been present in nearly all of the cases; in some there has been some swelling of the lymphatic glands.

The results of inoculations have not been as satisfactory in our hands as in the hands of Weichselbaum and Jaeger. Subcutaneous inoculations failed. Rabbits and guinea pigs have been found the most susceptible. It is possible in some cases to kill these by injecting large amounts (1 cc. or more, of a pure culture,) into the pleura and peritoneal cavity, with the production of a fibrinous exudation.

The organism has also been obtained in 19 cases where lumbar puncture has been made for purposes of diagnosis. The fluid withdrawn varies in appearance from a clear or very slightly cloudy serous fluid up to almost pure pus. When withdrawn in the beginning of the disease it is always more purulent than later. In one case, which was tapped three times, the fluid was at first decidedly purulent, and in the last tapping almost clear. Microscopically it contained poly-nuclear leucocytes, here and there a lymphoid cell, and a few large cells, evidently of endothelial origin. The bacteria are present in variable numbers and almost always in the pus cells. In these, sometimes a single coccus is found, sometimes the cell may be filled with them. Their resemblance to the gonococci is very strong. They may be distinguished

from these by their less intensity of staining and by their slight variability in size. There should be no possibility of confounding them with the pneumo-cocci from which they may be distinguished, not only by their shape, but by their staining reaction and by the differences in culture.

Without denying the possibility that cerebro-spinal meningitis, even in an epidemic form may be produced by the pneumococcus, we are disposed to think that most cases of the severer epidemics will be found to be due to this organism of Weichselbaum.

(I have been greatly indebted to Drs. Mallory and Leary, at the City Hospital, to Dr. Wright, at the Massachusetts General Hospital, and to Dr. Wentworth, at the Children's Hospital, for their observations on the disease.)

DR. D. A. SARGENT spoke upon

“STRENGTH TESTS AND THE STRONG MEN  
OF HARVARD.”

In January, 1880, the present system of Strength Tests was introduced at Harvard University in connection with the physical examinations at the Hemenway Gymnasium.

On account of its accuracy in registering, its simplicity of adjustment and its convenience in handling, the modern spring dynamometer has been adopted as

the basis for the Harvard Strength Tests. But a test of muscular power alone does not give one any knowledge of a man's ability to repeat his efforts. This brings into requisition other attributes which depend upon a good circulation, vigorous heart and lungs and a well developed and well controlled central nervous system.

As a test of these qualities, and because one can attain the limit of his efforts much quicker, each person examined is required to push his weight up between two parallel bars, "dipping" as it is termed, as many times as possible. This performance is then followed after a minutes' rest by an attempt to pull one's weight up from a hanging position with straight arms, until the chin is on a level with the hands which grasp a bar or two suspended rings. These two performances, although they bring different muscles into play, follow each other so closely that the heart, lungs and nervous system, in addition to the muscles employed are put to a pretty severe test.

Previous to making these repeated efforts, the volumetric capacity of the lungs has been taken with a spirometer, and the propulsive efforts of the expiratory muscles have been measured by a manometer. The heart and lungs are also examined by the aid of the stethoscope before and after these exercises.

One of the first requirements in order to have the strength test go on record, is that all of the tests shall

be made consecutively, and that they shall be made inside of fifteen minutes.

The handle bar for the dynamometer used for the lifting test must be a rounded piece of wood not over twelve inches long nor more than one and one-quarter inches in diameter.

In making the test for the strength of the back, the legs must be kept straight at the knee. Although this position brings considerable strain upon the "ham strings" and extensors of the thighs, the main part of the strain comes upon the muscles of the back, as the back is bent forward at an angle of 60, 70, or 80 degrees.

In making the leg lift, the body is held erect with the chest thrown forward, and the knees bent at any angle to suit the physical peculiarities of the lifter. In this test the handle bar is placed upon the thighs and held there, firmly grasped by the hands with the fingers beneath the bar. While in this position the grip is secure, as the fingers are pressed between the handle bar and extensor muscles of the leg.

The all-round nature of the different tests makes it desirable to have a general summary, in order to determine a man's all-round ability. This summary is made up as follows: The strength of the back and legs, the grasping power of the right and left fore-arms, and the strength of the lungs, so called, are first added together as evidence of the muscular

strength of the parts tested. To this amount is added the number of times the body is lifted in the manner described on the parallel bars and rings, multiplied into \*one tenth of the weight.

The summary of all the tests may be considered as the total actual strength, as contrasted with the potential strength which may be said to be represented by the body measurements.

In order to judge of the tests made by the mass of the students let us take a specific case. Mr. A. was examined at the gymnasium in January, 1880. At this time his strength of lungs was found to be ten hectograms, his strength of back 100 kilos, legs 160 kilos, right fore-arm 40 kilos, left fore-arm 36 kilos. His weight was 60 kilos. In making the test on the parallel bars he pushed his weight up five times, and pulled his weight up on the rings four times. The sum of these two efforts (nine times) multiplied into one-tenth of the weight (6.0 kilos) equals 50 units of work, or "points" as they are generally termed. These points are added to the other tests and the total strength is found to be 400 points. In getting at this result it will be noticed that hectograms, kilograms and number of times the body is raised, etc., are added together promiscuously, since this process in no way affects the tests, which are simply relative.

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\*Note. The reason why one-tenth of the weight is used for a multiplier instead of the whole weight, is simply to reduce the number of figures which are entered upon the records.

Out of 579 men examined in 1880, five per cent failed to make a total equal to 275 points, ten per cent fell below 300, twenty per cent fell below 325, while only five per cent succeeded in making a total exceeding 550 points. 400 points were the number that fifty per cent surpassed and that fifty per cent failed to reach. The strongest man in 1880 had a total of 675.2 points. The next year, 1881, the showing made with the strength tests is even poorer, as fifty per cent of all the men examined for the first time this year failed to make a total test of 350 points. This drop may be readily accounted for by the fact that the examinations in 1881 were largely of Freshmen, who presumably had had little physical training, while the previous year included the older men from all the classes.

The tests made, therefore, in 1880, give us a very good idea of the physical condition of the mass of students in College at that time, and the tests made in 1881 show us the physical status of the Freshmen as they came to us from the preparatory schools. From this year, 1881, onward to 1897, there has been a gradual increase in the strength tests of the incoming classes.

In 1880 the medium or average strength of the 579 men examined from all the classes then in College was 400 points. The average for the 689 men examined in 1896, from Jan. 2nd. to June 1st., the same period as covered by the examination in 1880, was 625 points.

To what is this remarkable increase of strength

among the student class of the community attributable? I have no hesitation in saying that this general improvement in muscular power furnishes us with indisputable evidence of the low muscular tone of the students in college in 1880 and of the extensive practice among our youth at the present day of some form of physical exercise.

In the students of the present generation this power has been greatly augmented by inherited vigor, better nutrition and habits of living, better sanitary conditions, and improved methods of physical training.

Not only are the young men who now come to college in better physical condition than those who entered in the early eighties, but many of them are possessed of the necessary knowledge for keeping themselves so.

At the present time all students of Harvard University desiring to enter as competitors in athletic contests are required to give evidence of their ability by making a strength test according to the method described in addition to the regular examination. Candidates for the University Crew and Foot Ball Team and Weight Throwers are expected to make a total strength test of 700 points. Candidates for the Class Crews and Foot Ball Teams and Gymnastic, Wrestling and Sparring Contests 600 points. Candidates for the University and Class Ball Nines, Lacrosse Teams, Track and Field Events 500 points.

The great mass of young men who can never hope to make any of the University Athletic Teams, as these numbers are necessarily limited, can have at least the satisfaction of trying to attain and pass the strength standard required of the members of these organizations. I think perhaps this has been one of the strongest factors in raising the average of the strength tests during the past few years.

Another incentive has been given to these contests by classifying those examined into groups, where the method pursued bears some resemblance to that used for ranking men in their studies. Those who get over 1000 points are classed in the \* group, those who get between 800 and 1000 are classed in group A, those between 700 and 800 in group B, between 600 and 700 in C, 500 and 600 in D, 400 and 500 in E, 300 and 400 in F, and 200 and 300 in the lowest group, G.

Without going into details we may readily classify all exercises into two great groups, those which enable the body to handle its own weight, and those which enable it to bear the burdens which may be imposed upon it. In regard to the action of the lower limbs, these groups are often identical, but as applied to the trunk and movements of the upper limbs they are often antagonistic. The great force with which man is always contending is gravity, and the peculiar formation and anatomical structure which we call man has been developed largely by the effort to move about in an upright position.



If a light weight is carried for a long time in the hands, or if frequent attempts are made to lift very heavy weights, the shoulder girdle will be drawn downward, and the chest walls compressed. If the weight is carried in one hand the shoulder on that side will be drawn down, and the spine will be curved to that side. If on the other hand frequent attempts are made to lift light weights, thereby contracting both the trapezius and deltoid—the shoulder girdle will be gradually raised, and the chest walls expanded. If these exercises are supplemented by such as may be performed on parallel bars, suspended rings, ladders and horizontal bars, where the arms have a fixed attachment and the force that is operating on the trunk is upward—all of the diameters of the chest may be greatly enlarged.

When the muscles about the chest, shoulders and upper back become too much developed they restrict the movements of the arms, and actually interfere with the function of respiration. A man so developed would find it very difficult to box, throw a ball, put the shot or do anything with the arms requiring great range of movement. Such a man is literally incapacitated for the performance of certain feats by the extreme development of antagonistic muscles.

One of the attractive strength feats the world over has been the elevating of heavy weights above the head. The weights usually used have been dumb-

bells on account of the convenience of manipulating them. The men who have held the records for these performances in the past have usually been heavy men, ranging from 200 to 300 pounds. The advent of Sandow introduced a new method which has made it possible for comparatively light men to compete with heavy men in these weight elevating performances. The philosophy of this new method, apparently so opposed to all known physical laws, has never to my knowledge been satisfactorily explained.

We have among our own number (for he is a member of the Harvard Medical School) a young man who has succeeded in establishing a new world's amateur record by elevating a 21 pound dumb-bell from the floor to his right shoulder with both hands, and to a vertical position above his head with one hand. The remarkable fact about this performance is that Mr. Rood weighed only 145 pounds at the time the feat was accomplished.

The development of the grip was one of the first things to which Mr. Rood had to give his attention. That he has made progress in this direction he will show you before the evening is over by tearing two packs or 104 playing cards asunder in one continuous effort. (This was done later.) Having developed the grasping power of the hands the next difficulty was to raise the bell to his shoulders. The bell is grasped firmly with the right hand while the left

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hand is held in the air very much as in a starting position for a running race ; then, after taking two or three long breaths, the bell is grasped with the left hand, while the pelvis drops backwards allowing the legs to bend at a right angle at the knee. The right elbow is then swung on to the right thigh, and using this point for a fulcrum, the bell is by the aid of the flexors of the right arm lifted from the floor, as if by a crane, while it is pushed over and elevated to the right shoulder by the combined action of the left arm, left chest and the muscles of the back and legs. When in this position a deep breath is taken, and the right elbow and lower part of the right upper arm rest on the pelvis and lower ribs of the right side. From this position it will be observed that a lighter dumb-bell would be started on its upward journey by a contraction of the long head of the biceps, coracobrachialis, and the anterior fibres of the deltoid, but for so heavy a weight these muscles would avail nothing, because they are obliged to work at such a disadvantage, almost directly against the joint in the glenoid cavity. But unless the deltoid acts it will be impossible for the triceps to act, for in its present position an effort to straighten the arm would simply result in the bell being pushed downward to the floor.

While the bell is poised on the forearm which is resting at the elbow on the crest of the ilium, the body begins gradually to bend over to the left side sending

down a prop in the shape of the left arm to the left knee, thereby securing a broader and a firmer base, but in so doing the ribs on the right side are bulged outward and upward, the weight of the bell is gradually shifted from the elbow to the humerus which now tilts as it were over the rounded ribs like a see saw over a barrel. While in this position the deltoid and triceps have an opportunity to act in a peculiar and very efficient manner. It will be observed that when the right arm and body are in this position the forearm is balanced upon the ribs by the alternate play of the triceps and biceps. If the triceps relax, the bell loses its balance and tends to fall towards the shoulder, but this movement aids the deltoid which is struggling to lift the humerus away from the body. If on the other hand the biceps relaxes, the bell tends to drop downward, by straightening the fore-arm at the elbow, but this is just what the triceps is trying to do. In a word by putting these antagonistic muscles against each other, and by carefully watching its opportunity the deltoid is finally able to lift the humerus up on to a line with the shoulder, so that the arm is straight above the head, when the powerful muscles of the right lateral trunk, and erector spinae group have but little difficulty in bringing the body to an upright position.

In the execution of this feat by this peculiar method, the performer is greatly aided by the relaxed condition of the pectoralis major and latissimus dorsi, and

the opportunity to bring into action the serratus magnus. But the one thing that makes the feat possible for a light man, is not so much the great strength of the arms and shoulders, as the ability to flex the spine by relaxing the muscles about the waist and loins.

Sometime ago Dr. Dwight called the attention of the Society to the ability of contortionists to relax or inhibit the contraction of antagonistic muscles. I have no doubt in my own mind that the ability to perform certain athletic feats, including feats of strength, may be attributed to the same power.



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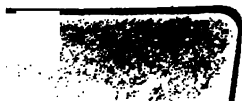
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At the meeting held May 18, 1897, Dr. C. J. WHITE gave the results of his work on

“RINGWORM AS IT APPEARS IN BOSTON.”

Up to a few years ago the dermatological world believed that all clinical forms of ringworm were caused by one and the same plant, but in 1893-4 Dr. ROBERT SABOURAND, of the St. Louis Hospital of Paris, published his admirable book entitled “*Les Tricophyties Humaines*,” which entirely revolutionized our former simple ideas and set many continental observers at work to verify his assertions.

To summarize briefly, Sabourand's conclusions were these: He found that there were two distinct plants causing ringworm—one, the megalosporon, belonging to the Botrytis, so-called on account of its fructifying in grape-like clusters; and the other, the microsporon of Andouini, not a tricophyton at all, but a plant not yet placed by the mycologists.



The *Megalospora*, Sabourand divided in two groups according to their manner of growth, *i. e.*, whether the spores formed inside the hair or outside. These divisions he called *megalosporon endothrix* and *megalosporon ectothrix*. The former Sabourand never found upon the domestic animals, whereas the latter he isolated from cats, dogs, horses, pigs and birds. Of the *endothrix* variety, Sabourand found some to have a mycelium resistant to heat and others not, so that this characteristic formed a further subdivision.

Sabourand's results thus far had been gained by the microscope; he then invented a suitable medium for the growth of these plants and found that his cultural results coincided very closely with his microscopical.

My researches extend over two winters and my conclusions are based upon about two hundred microscopical examinations and between three and four hundred inoculations. In a few words my deductions are as follows:

The *microsporon Andouini* occurs in the majority of cases in ringworm of the scalp; in Boston 95 per cent. of all scalp cases are due to this plant, in Paris 60 per cent. and in London 80 to 90 per cent. This plant has never been found in the scalp of an individual after the age of fourteen years. In Paris this variety has not been isolated from the beard or from

the smooth skin, but in England it has been found in the beard and in Boston it occurred three times in the beard and three times on the body. Thus with us, it proves to be the commonest variety of ringworm, causing 56 per cent. of all cases of this disease.

The microsporon Andouini occurs always on the outside of the hair. The growth consists of innumerable small, round spores about 3 micromillimeters in diameter and it is only in the very newly infected hair that one can perceive any mycelium. The spores lie in a dense mass, the arrangement of which Sabourand aptly compared to a mosaic.

The megalospora occur both inside and outside the hair, and at times the whole shaft is invaded and surrounded. Here we find the spores varying in size from 5 to 7 micromillimeters. They are not round but rectangular and the mycelium is always visible. In Boston the mycelium has always proved itself resistant to heat, while in Paris this was not the case.

The medium which Sabourand concocted for his cultures is composed of Peptone 5 parts, Agar-agar 13, maltose 38, and water 1000. He found that in deviating from this formula impurities crept into the cultures in direct proportion to the decrease in the amount of maltose and the increase of the peptone.

This medium has proved a trying one in my hands as it has with English and German students. By this I mean that all depends on some unknown quality

in the different samples of maltose which came to us. With one bottle successes have been abundant, with another failures have been the rule and as this is an expensive material and the manufacture of the medium requires many consecutive hours of work I can show tonight the proportionately small successes of between three and four hundred inoculations. But I am glad to say that these positive results correspond fairly closely, as far as they go, with those of Sabour- and of Paris and Colcott Fox of London.

In conclusion let me say a few words as to technique. For the quick examination of the specimens I should recommend placing a few drops of ether over the hair or the scale to remove the fat, and secondly a few drops of a 40 per cent. solution of caustic potash to dissolve the keratin. Place a cover-slip gently over the specimen and in a few minutes examine the slide with most of the light excluded. Don't mount in glycerine, for the refraction of the fungus and the glycerine is so nearly alike that the plant will be scarcely discernible.

For the staining and preservation of the specimen, Malcolm Morris of London recommends the following method which he claims is the best one yet devised, as it avoids the use of the hydrate of potash which he says must alter the shape and size of the spores :

1. Ether.
2. Solution of 5 per cent. gentian violet in 70 per

cent. alcohol. Five minutes required for the microsporon; one-half hour and heat for 5 minutes for the megalosporon.

3. Iodine solution.

4. Anilin oil, or 2 to 4 drops  $\text{HNO}_3$  in anilin

5. Anilin.

6. Xylol.

7. Xylol balsam.

For the inoculation of the medium very little care is necessary. A very small scale or a small part of a hair is placed in the centre of a large flat surface of the medium, the cotton replaced and the Erlenmeyer flask put into the thermostat at a temperature of  $37^\circ \text{C}$ . One must not expect any signs of growth much before a week is passed.

Dr. E. H. BRADFORD addressed the society upon

“CONGENITAL DISLOCATION OF THE HIP.”

Congenital dislocation of the hip differs from a traumatic dislocation in the fact that the capsule is not ruptured but stretched. The dislocation occurs in uterine life; the cause is unknown, attacking girls much more frequently than boys.

The pathological anatomy displays as the chief characteristic the alteration in the capsule, which is both stretched and thickened, especially on its anterior surface. As the head of the femur lies upon the dorsum, the stretched capsule, pulled upward by the

femoral head, covers the acetabulum, and becomes adherent to the ileum, where it lies in contact in the region around and above the edges of the acetabulum.

These adhesions form the thickness and strength of the capsule on its anterior aspect and form obstinate obstacles to reduction, and unless they are overcome it is impossible to replace the head thoroughly in the socket. In addition to this there is the shortening of the pelvi-femoral muscles, particularly the adductor group, distortion in the shape of the head of the femur, and a shallowness and alteration in the shape of the acetabulum are also present. The head is sometimes conical and sometimes irregularly flattened. The cartilaginous surface covering the head also varies.

The neck is twisted to an extent from twenty to forty degrees, and is less oblique than is normal. The cartilage which should cover the acetabulum is altered so that only a vestige remains around the rim. The cotyloid ligament is absent, the acetabulum is shallow and triangular in shape. There is no osseous formation to hold the head in its new position and the pelvis is slung to the top of the femur by the muscles and capsule in much the same way that an old-fashioned carriage is slung to the truck by leather straps. The gait becomes peculiar and as the patient grows heavy and old severe disability may follow.

The obstacles to successful treatment are many. First, the alterations in the bone, *i. e.*, the head, neck

and acetabulum. In young children the alterations in the anatomy of the bones do not present insuperable obstacles. Where an obliquity and twist of the neck of the femur exists the gait cannot be, after correction, as perfect at first as is desirable. This in growing children, however, will be overcome as the bone adapts itself to the normal conditions, and grow normally. Furthermore this can be largely corrected by a subsequent osteotomy if necessary.

The shallowness of the acetabulum will in young children also correct itself under the normal use of the joint, and this can also be said of the shape of the head. In adolescents, however, and in adults, this cannot be expected to take place, and the result will necessarily be imperfect.

The muscular shortening presents an obstacle to correction which can be overcome by mechanical means, either by incision or stretching.

The capsular contraction is of a special importance and is difficult to deal with in older children. It does not stretch readily, and does not yield to force in all instances. It is then necessary to divide the capsule and this should be done with the least destruction of muscular tissue, for it is largely upon free play of the muscles that the function of the joint depends. The necessary incision should be carefully made, and it should be born in mind that the portion of the capsule, which is especially resistant, is that portion on

the anterior and inner part of the joint, or that portion which runs from the ileum between the anterior-superior spine and the acetabulum passing down to the lesser trochanter, and portions of the femur in the spiral line. In other words, that portion which prevents a complete abduction and hyper-extension of the limb.

[Many lantern slides and dry preparations were shown.]

Dr. E. H. NICHOLS spoke upon

**“THE PATHOLOGICAL ANATOMY OF CONGENITAL DISLOCATION OF THE HIP JOINT.”**

Illustrated by dry and wet preparations and lantern slides.

(From the Sears Pathological Laboratory of the Harvard Medical School.)

The following description of the anatomy of congenital dislocation of the hip joint is based entirely upon the examination of four specimens, including six joints, of this deformity. Two specimens (three joints), are the dried bones only; two specimens (three joints), are alcoholic preparations, and the ligaments and the essential muscles.

**The Normal Hip Joint.**—The acetabulum is a hemispherical cup, directed downward, outward and forward, bounded by an uneven rim thickest above. The head of the femur is globular, and directed upward, inward and forward. The neck of the femur joins the shaft at an angle of  $130^{\circ}$ . The shaft of the femur is

twisted on its long axis, the angle of torsion being about  $25^{\circ}$ . The fossa acetabuli is relatively small, filled with fat tissue, which is covered with synovial membrane. The capsular ligament is attached to the periphery of the acetabulum, and, externally to the base of the neck of the femur.

Pathological Anatomy.—From an examination of the six above-mentioned specimens it appears that:—

1. The anatomical conditions, as a whole, vary within considerable limits in individual cases.

2. Certain anatomical peculiarities, especially in the bones, are tolerably constant.

3. The acetabulum is triangular, shallow, and faces outward, and is insufficient to retain the head of the bone in place even if reduction is possible.

4. A new articular surface for the dislocated head of the femur is sometimes present upon the surface of the ilium.

5. The head of the femur is abnormally small and irregular in shape.

6. The neck of the femur is short, and makes nearly a right angle with the shaft.

7. The angle of femoral torsion is very much increased.

8. The shaft of the femur may show outward bowing.

9. The capsule is approximately hour-glass shaped. The upper dilatation is adherent to the surface of the



ilium and to the overlying glutei, and may be adherent to the head of the femur. The capsule is constricted at the middle, while the lower portion is dilated by the attachment of the fibres to the acetabulum.

10. The ligamentum teres is wanting in these cases.

11. The articular surface of the acetabulum is very small.

12. The capsule is thickened, especially above the acetabulum.

13. The muscles play a subordinate part.

The obstacles to reduction are due chiefly to the peculiar attachment of the capsule, above, laterally, or below. The muscles may offer slight resistance.

Difficulty in retaining the femur in place, if reduction is possible, may be due to a shallow acetabulum or to an extremely short neck.

Dr. J. L. GOODALE gave the results of experiments

“ON THE ABSORPTION OF FOREIGN SUBSTANCES BY THE FAUCIAL TONSILS IN THE HUMAN SUBJECT.”

(From the Laboratory of the Massachusetts General Hospital.)

In 1895, B. Fraenkel, in a paper read before the Laryngological Section of the British Medical Association, called attention to the frequency with which acute lacunar tonsillitis follows trauma and inflam-

mation of the nasal mucous membrane. From this circumstance, and also on the theoretical grounds that a direct infection of the tonsil through its own epithelium could occur with difficulty against an outflowing stream of lymph and leucocytes, he concludes that in this class of cases at least, acute lacunar tonsillitis arises from a primary infection of the nasal mucous membrane transmitted to the tonsil by way of the lymph stream. His histological examinations showed the presence of bacteria in the tonsillar tissues as well as in the crypts.

An investigation of this hypothesis demands first, the determination of the question whether the tonsil is capable or not of absorbing into its interior, foreign substances lying in contact with its mucous membrane.

Although the tonsil is generally credited in the text books with possessing an absorbant power, yet so far as the writer is aware, this view has never been experimentally proved. Indeed, the experiments of Hodenpyl, the most complete hitherto on the subject, in which substances were applied to the free surface of the tonsils of lower animals, led him to conclude that the tonsil does not absorb through an intact mucous membrane.

In view of the great difference existing between the stout, compact mucous membrane covering the free surface of the tonsil, and the delicate loose character

of that lining the crypts, it appeared to the writer reasonable to expect that absorption, if it existed at all in the tonsil, would occur more readily through the latter than through the former. The following experiments were therefore undertaken.

Foreign substances were introduced into the crypts of human tonsils, which were more or less hypertrophied and consequently demanded excision. After the substance had remained a given time in the crypts the tonsil was excised and portions of it immediately placed in corrosive. After paraffine-imbedding, serial sections were made through the crypts in question, stained, and examined. After much experimenting, carmine in aqueous suspension proved the most satisfactory substance for this purpose, owing to its insolubility, inert nature, extreme fineness, and conspicuous appearance. In sections stained with haematoxylin and aurantia, particles of carmine smaller than streptococcus pyogenes were easily recognizable. The carmine suspension was introduced into the crypts through a blunt pliable silver canula fitted to a hypodermic syringe.

#### SUMMARY OF RESULTS.

Twelve cases were thus examined. As a control, in two cases the tonsils were excised immediately after the introduction of the carmine. The other cases ranged as regards the time intervening, from twenty minutes to ten days.

Under the microscope the following appearances were noted :

Cases I and II.—Immediate excision after introduction of carmine. Carmine was present in abundance in the crypts, but had not in any place penetrated the mucous membrane.

Case III.—Carmine in crypts twenty minutes.—Examination showed distinct lines of the finer carmine particles extending from the crypts into the mucous membrane for a variable distance, being deepest where the structure of the membrane was loosest. In a few places scattering particles of carmine were visible below the mucous membrane for a distance of two or three cell layers. Some of the polynuclear leucocytes in the crypts contained carmine particles in their interior.

Cases IV., V., VI., VII. and VIII. — Carmine in crypts for periods ranging from forty-five minutes to two hours.—Examination showed in all cases essentially similar appearances, namely, masses of carmine in the crypts, whence fine lines of carmine particles extend into the mucous membrane lying in the intercellular spaces in direct proximity to mononuclear and polynuclear leucocytes. Some of these latter contained carmine particles in their interior. In several places carmine particles were found sparingly below the mucous membrane for short distances.

Case IX. — Carmine in crypts two days. — Exam-

ination showed carmine masses chiefly in the deeper portions of the crypts. The intercellular spaces of the mucous membrane adjoining were filled with carmine particles, chiefly in linear arrangement. The lines of carmine extended below the mucous membrane between the follicles in the direction of the supporting fibrous trunks. In and immediately adjoining the mucous membrane the polynuclear leucocytes were unusually abundant, many being filled with carmine particles and in a state of nuclear fragmentation.

Cases X. and XI.—Carmine five days in crypts.—The appearances were essentially similar to those of the preceding cases, although in one the nuclear fragmentation of the polynuclear leucocytes in the neighborhood of the carmine was more pronounced.

Case XII.—Carmine in crypts ten days.—Examination showed few carmine particles in the crypts, but in the tonsillar tissue adjoining, very numerous and conspicuous lines of carmine situated in the interfollicular lymphatic spaces, extending from the crypts to the supporting fibrous trunks of the organ. The lines of carmine were arranged roughly parallel to each other, so that under a low power the appearance was presented of a carmine band. Little reaction was apparent on the part of the polynuclear leucocytes.

It was noted that the penetration of carmine particles was in the regions between the follicles, particles

not being found in the germ centers or in the interior of the follicles.

Sections of these cases were stained by Gram's method for bacteria, with positive results in all. The bacteria in every instance were limited in situation to the crypts, careful search failing to reveal any in or below the mucous membrane, except here and there in the most superficial layers, where they generally were in the interior of the polymorphonuclear leucocytes. In case IX. the crypts contained enormous numbers of cocci and bacilli.

In connection with these experiments, solutions of anilin colors in normal salt solution were introduced into the crypts of living tonsils and allowed to remain one hour. The tonsil was then excised and sections cut by the freezing microtome. Examination showed a distinct penetration of the color into the mucous membrane and in places for a short distance below it.

In four cases of acute lacunar tonsillitis one or both tonsils were excised and sections examined by Gram's method for micro-organisms. Cocci were present in abundance in the crypts, but none were found in the tonsillar tissue itself except in the superficial layers of the epithelium.

The preceding investigations demonstrate that —

I. Absorption exists normally in the tonsils and takes place through the mucous membrane of the crypts.

II. The path of the absorbed substances is in the interfollicular lymph spaces in the direction of the larger fibrous trabeculae.

III. During the process of absorption, foreign substances encounter phagocytic action on the part of the polynuclear leucocytes situated in and adjoining the mucous membrane.

IV. Bacteria are normally present in the crypts of the tonsils, but are not, at least ordinarily, demonstrable in the tonsillar tissues proper.

V. In acute lacunar tonsillitis bacteria are greatly increased in numbers in the crypts, but do not necessarily occur in the tonsillar tissues, although, under certain conditions, as in Fraenkel's cases, they may do so.

In view of the preceding facts, the supposition appears possible that bacteria may be continually making their entrance into the tonsillar tissues, but at the moment of entering ordinarily encounter conditions which terminate their existence.

Furthermore, since it is not necessary for bacteria in acute lacunar tonsillitis to occur in the tonsil outside of the crypts, the possibility is at once suggested that the inflammation of the tissues may be due to the absorption through the mucous membrane of irritating toxins formed in the crypts, as in a culture-tube.

Finally, while in some cases acute lacunar tonsillitis may, as by Fraenkel's hypothesis arise from a

primary infection of the nasal mucous membrane, yet the possibility is shown by these experiments that the tonsils may also become directly infected through the fluids of the mouth.

[My thanks are due to Dr. J. H. Wright, director of the laboratory of the Massachusetts General Hospital, under whose supervision the preceding work was performed; also, to Dr. Langmaid, surgeon for diseases of the throat, in the Children's Hospital, and to Drs. Coolidge and Clark, physicians for diseases of the throat, in the Massachusetts General Hospital, for kind permission to avail myself of the material in their clinics.]

Dr. H. F. HEWES gave the results of

“FIFTY NORMAL BLOOD COUNTS.”

The number of red corpuscles in the blood of the normal adult averages in men 5,000,000 per cubic millimeter, in women 4,500,000 per cubic millimeter. The limits of normal variation lie between 4,000,000 and 6,500,000 for men, 3,700,000 and 5,200,000 for women. These figures are made up from the results of twenty-five sets of investigations made by separate observers with modern methods.

Of these twenty-five sets of observations, 10 are German, 5 French, 3 Austrian, 4 Russian (Dorpat), 2 Danish, 1 Italian.

The average of the German observations is 5,180,000, of the Austrian 4,880,000, of the French 4,600,000.

As far as I know no observations in regard to this subject have been reported in England or America.



The investigation of which I wish to report the results, consists of the counts of the number of red corpuscles in the blood of 50 healthy individuals. The subjects were all young men between the ages of 18 and 25 years. They were all of American birth.

My method in each case was as follows :

The blood was obtained between the hours of 11 and 1 A. M.

The specimen was drawn from the ear with all necessary precautions, diluted, and counted at once

The diluting fluid used was Gowers' Solution, consisting of Sodium Sulphate gr. CXII, acetic acid  $\zeta$ v, water  $\zeta$ iv.

The count was made with the Thoma-Zeiss instrument.

In each case 2,000 or more corpuseles were counted on each of two slides.

The results of the 50 counts are as follows :

The average of all the counts is 5,809,000 corpuscles per cubic millimeter.

The minimum count was 5,120,000.

The maximum count 6,400,000.

Fifteen counts exceeded 6,000,000.

These results fall within the limits made up from the European observations. The average is higher than any of the reported averages, but this is natural in view of the fact that my subjects were all young men.

Three sets of observation upon the blood of young men are reported. One in Germany by Graeter, two in France by Hayem and Patrigeon. Graeter found the limits of variation in his cases as between 4,405,000 and 6,100,000. Patrigeon gives the limits in his cases as between 5,000,000 and 6,000,000. Hayem gives the limits in his cases as between 5,060,000 and 6,100,000.

The results in my cases are in practical accord with these recorded observations on youths.

Dr. H. C. ERNST demonstrated the new Zeiss 1a microscope stand, loaned for the occasion by Mr. Francis Blake.

(*Correction:* On page 7, line 4, of number 11, insert "the stimulation of" between "of" and "muscle"; on page 8, line 7, for "on" read "or".)



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At the meeting held June 1, 1897, DR. R. M. PEARCE presented a

“BACTERIOLOGICAL REPORT OF 121 CASES OF ACUTE LOBAR PNEUMONIA, AND OF 128 CASES OF ACUTE BRONCHO PNEUMONIA ; TOGETHER WITH 55 CASES OF VARIOUS INFECTIONS DUE TO THE PNEUMOCOCCUS.”

(An abstract of a paper which is to be published in the BOSTON MEDICAL AND SURGICAL JOURNAL.)

A report of all the cases of acute lobar pneumonia and acute broncho-pneumonia which have come to autopsy and have been studied bacteriologically at the Boston City Hospital between May 1st of 1894 and May 1st of 1897. It includes also the report of various infections due to the pneumococcus found at autopsy or at operation.

The work has been carried on under the direction of Prof. W. T. Councilman, in the Pathological Laboratory of the Boston City Hospital.

The methods of study pursued were those usually employed. Löffler's blood-serum prepared according to Mallory's modification, was the culture medium used. Cultures were taken from the solidified lung, pleural and pericardial exudates, if present, and heart's blood, liver, spleen, kidney, and various lymphatic glands. In some cases direct examination by cover-slip preparations was made.

In 121 cases of acute lobar pneumonia the pneumococcus was found in the solidified lung in 110 cases, in 84 of which it was the only micro-organism present. In the remaining 26 cases it was associated with the staphylococcus pyogenes aureus 9 times, streptococcus pyogenes 8 times, staphylococcus pyogenes aureus and streptococcus 3 times, streptococcus pyogenes and staphylococcus pyogenes albus twice, bacillus capsulatus (Wright) once, staphylococcus pyogenes albus once, Klebs-Löffler bacillus once, both Klebs-Löffler bacillus and streptococcus pyogenes once.

(In this summary the presence of the bacillus coli-communis has not been considered of sufficient importance for classification).

Of the 11 remaining cases, in 8 the lung culture was not taken in 4, lost in 2, and sterile in 2, but in each of these there was a general infection with the pneumococcus, and in 3 it was present in either pericardial or pleural exudate. This would justify the conclusion that the process in the lung was due to the

same organism and was the source of the general infection. If therefore these cases are added to the others they make a total of 118 out of 121, or 97.5 per cent. due to the pneumococcus.

With the exception of the 8 cases just considered, in only 3 cases of the 121 was the pneumococcus not present in the solidified lung or pleural exudate. These cases both macroscopically and microscopically were true lobar pneumonias. In one case there was a general staphylococcus infection following epididymitis, cystitis and pyelo-nephritis. Cultures from lung showed abundant growth of staphylococcus pyogenes aureus. In the second case, complicating typhoid fever, lung cultures showed abundant growth of the streptococcus pyogenes. It is very probable that in both these cases the growth of the pneumococcus was inhibited, or was present in small numbers but obscured by the profuse growth of the other organism. The third case was an old pneumonia, well along in the third stage, in which the staphylococcus pyogenes albus only was found. It is very probable that in this case the pneumococcus was the causative agent, but had died out.

In this series the bacillus of Friedlander was not met with at all.

#### COMPLICATIONS.

In the exudate of acute pleuritis and acute pericarditis associated with pneumonia, the pneumococcus was

found in every case in which examinations were made, 49 times in pleural exudates and 15 times in pericardial exudates.

Abscess of lung following pneumonia occurred in three cases. In two of these the pneumococcus was the only organism present. In the third case, which was an unresolved pneumonia, the staphylococcus pyogenes aureus and the streptococcus were also present in addition to the pneumococcus.

In 2 cases in which an acute meningitis, and in 3 in which an acute endocarditis was associated with or followed the pneumonia, the pneumococcus was present in pure culture. This was also true of one case of acute fibrinous peritonitis.

As regards general infection, in this series of 118 cases, the pneumococcus was found in the heart's blood 56 times, liver 44 times, spleen 47 times, kidney 51 times, and in 2 cases in which the exudate extended up through the mediastinal tissues to the neck, the pneumococcus was present in the infiltrated tissues and cervical glands.

As regards the intensity of the infection, in 18 cases it was found in all of the organs, that is heart's blood, liver, spleen, and kidney; in 18 cases in three, in 21 cases in two, and in 24 cases in at least one.

The results in this series agree with those of Frankel, Weichselbaum, Netter, Welch, and others; though the proportion of cases in which the pneumococcus

was found is greater, as is also the number of cases with general infection.

#### ACUTE BRONCHO-PNEUMONIA.

This report includes 128 cases, which may be divided into two classes, those associated with the acute infectious diseases of childhood, 82 cases; and second, those associated with other medical and surgical affections and generally occurring in adults, 46 cases.

Of this first class 62 were associated with diphtheria alone and the organisms present were the Klebs-Löffler bacillus 52 times, the streptococcus pyogenes 27 times, the staphylococcus pyogenes aureus 11 times, the staphylococcus pyogenes albus once, and the pneumococcus once. The Klebs-Löffler bacillus occurred alone in 17 cases, the streptococcus pyogenes alone in 7 cases. In the rest of the 62 cases the organisms occurred in various combinations.

In 9 cases of scarlet fever and diphtheria combined, the Klebs-Löffler bacillus was present in every case, in 5 cases alone, in the other 4 associated with the streptococcus pyogenes, the staphylococcus pyogenes aureus, and the pneumococcus.

In 2 cases of diphtheria and measles combined, the Klebs-Löffler bacillus, the streptococcus and the staphylococcus pyogenes aureus were present in each case.



In 9 cases of scarlet fever the streptococcus was found in two cases, the pneumococcus in two cases, the staphylococcus pyogenes aureus in one case, the streptococcus pyogenes and staphylococcus pyogenes aureus in 3 cases, the pneumococcus and the staphylococcus pyogenes aureus in 1 case.

The association of the Klebs-Löffler bacillus with broncho-pneumonia in such a large proportion of the cases, 63 out of 73, would indicate that its presence was more than accidental; and its occurrence in pure culture in 17 cases strengthens the theory held by some observers, that broncho-pneumonia may be due to the action of this organism, with or without the aid of the pyogenic cocci.

Of other organisms associated with the broncho-pneumonia of diphtheria and scarlet fever the streptococcus pyogenes is the most common. In this series of 82 cases it occurred 44 times. The pneumococcus was present in only 8 cases, and it is of interest that 5 of these were scarlet fever cases. In 2 of the latter it was obtained in pure culture.

The second class of broncho-pneumonias, 46 in number, occurring principally in adults, are best studied by grouping them according to the diseases with which they are associated, as follows: typhoid fever, 5 cases, the colon bacillus in 2, the pneumococcus in 1, and the pneumococcus, streptococcus, pyogenes and staphylococcus pyogenes aureus in 1.

In the 5th. which was also complicated by diphtheria, the Klebs-Löffler bacillus, staphylococcus pyogenes and bacillus capsulatus were found.

Chronic purulent bronchitis, 4 cases, in 2 the streptococcus pyogenes alone; the pneumococcus in one and the staphylococcus pyogenes aureus in one.

Gangrene of lung, one case, colon bacillus only.

Chronic pulmonary tuberculosis, (with an associated non-tubercular broncho-pneumonia), 3 cases, in one the pneumococcus; in another the staphylococcus pyogenes aureus; and in the third the streptococcus pyogenes and staphylococcus pyogenes aureus together.

Acute miliary tuberculosis, 1 case, streptococcus pyogenes, general streptococcus infection.

Pulmonary thrombosis, 2 cases, pneumococcus in one; colon bacillus in the other.

Acute meningitis, 4 cases, in each the same organism was found in the broncho-pneumonia as in the meningeal exudate, in three the streptococcus pyogenes, in one the pneumococcus.

Acute nephritis, 1 case, the streptococcus pyogenes and the pneumococcus. General infection.

Chronic cardiac and renal, 6 cases, in three the pneumococcus alone, with general infection. The streptococcus alone in 2 cases; and the staphylococcus pyogenes aureus in 1 case.

Chronic nephritis, 2 cases, in one the pneumococcus and the staphylococcus pyogenes aureus; and in the other the pneumococcus and the streptococcus.

Acute ulcerative endocarditis, 2 cases, the streptococcus in one, the pneumococcus in the other.

Intestinal affections, 4 cases, in three of these, (diphtheritic colitis, chronic colitis and appendicitis, respectively,) the process in the lung was due to the streptococcus pyogenes. In the 4th., acute intussusception, the streptococcus pyogenes and the pneumococcus were present.

Acute peritonitis, 1 case, colon bacillus the only organism present.

Cerebral hæmorrhage or thrombosis, 3 cases, the pneumococcus, alone in two, the staphylococcus pyogenes albus in the third.

Multiple injuries with cerebral hæmorrhage, 1 case, the streptococcus pyogenes.

Acute suppurative inflammation of the middle ear, 2 cases, the streptococcus pyogenes alone in one, the streptococcus, pneumococcus and staphylococcus pyogenes aureus in the other.

Puerperal septicæmia, 1 case, the streptococcus pyogenes.

To sum up, the streptococcus pyogenes occurred alone in 16 cases, the pneumococcus alone in 12 cases, the staphylococcus pyogenes aureus alone in 6 cases, the staphylococcus pyogenes albus alone in one case, the colon bacillus in five cases, and the various combinations of these in the other cases.

It is noticeable that in all cases where a local or a general infection existed the associated broncho-pneu-

monia was due to the same micro-organism. But where the condition was a chronic or non-infectious process, as chronic cardiac and renal diseases, cerebral hæmorrhages, etc., the broncho-pneumonia was generally due to the pneumococcus; thus, of the twelve cases in which the pneumococcus occurred alone, eight were chronic diseases.

### III.

Various infections due to the pneumococcus, fifty-five cases.

The autopsy records show 26 acute infectious processes in which the pneumococcus was present, and which were not accompanied or preceded by a lobar pneumonia. These are divided as follows: acute ulcerative endocarditis, 6 cases; two cases were associated with chronic pulmonary tuberculosis, one with a broncho-pneumonia and one with an abscess of the myocardium; and in two there were no lesions besides the endocarditis. In all, the pneumococcus was the only organism present. In three cases there was a general infection.

Acute purulent meningitis, five cases. Two of these followed suppurative disease of the middle ear due to infection through the Eustachian tube after fracture of the base of the skull through the petrous portion of temporal bone. (These two cases have already been reported by Wright and Stokes in Boston Medical and

Surgical Journal, March, 1895). Pure culture of the pneumococcus was obtained in each case; and a general infection was present in each case. The third case was a broncho-pneumonia, pneumococcus was obtained in pure culture. The two other cases were apparently primary infections. The pneumococcus occurred alone in one, and in the other was associated with the streptococcus pyogenes and the diplococcus intracellularis meningitidis.

Acute fibrinous pericarditis, 3 cases. The pneumococcus was obtained in pure culture in each case.

Acute fibrinous peritonitis, six cases. One followed operation for radical cure of inguinal hernia; the pneumococcus present in pure culture; general infection. Two cases followed an acute endometritis, the pneumococcus present in pure culture, and also demonstrated in the endometrium and Fallopian tubes; general infection in both cases. One case followed rupture of pyo-salpinx, the pneumococcus present in pure culture. One case followed perforation of rectum with formation of pelvic abscess, colon bacillus and staphylococcus citreus present in addition to the pneumococcus. In the 6th case following appendicitis, there was a profuse growth of the pneumococcus with a few colonies of staphylococcus pyogenes aureus.

There was general infection with the pneumococcus in 6 cases. In three cases associated with leukæmia, chronic pulmonary tuberculosis, and general sarcoma-

tosis (with broncho-pneumonia) respectively, the pneumococcus was present in pure culture. (This last case has been previously reported by Dr. Wright.) In the remaining 3 cases it was associated with the staphylococcus pyogenes aureus.

In the Surgical and Medical Reports of the hospital, infection with the pneumococcus has been found 29 times. These infections are divided as follows: Pleuritis, 15 cases, in 7 of which the exudate was sero-fibrinous and the pneumococcus present in pure culture. In 8 cases of purulent pleuritis the pneumococcus was present in pure culture in 6 and associated with the streptococcus pyogenes in 2. These cases were, of course, all coincident with acute lobar pneumonia.

Acute abscess, 6 cases. In four of these the pneumococcus was present in pure culture. They were deep cervical abscess, abscess of leg, of upper eyelid, and of liver communicating with pleural cavity, respectively. In the other two, of the face and finger respectively, one had the staphylococcus pyogenes aureus present; and the other the streptococcus pyogenes in addition to the pneumococcus.

Acute suppurative otitis media, 2 cases. Pneumococcus alone in one; in the other associated with staphylococcus pyogenes aureus.

Acute suppurative mastoiditis, 3 cases. The pneumococcus alone in one, associated with the streptococcus pyogenes in the other.

Acute purulent peritonitis, 1 case, pneumococcus and colon bacillus present.

Gangrene appendicitis, 1 case, pneumococcus and colon bacillus present.

Pyo-salpinx, 1 case, pneumococcus present in pure culture.

The association of the pneumococcus with the above acute processes indicates that like the tubercle bacillus and the typhoid bacillus, it may in addition to its specific characteristic lesion, produce acute suppuration.

DR. J. B. BLAKE, gave the results of a study of

**"THE GENERAL AFTER EFFECTS OF ETHER."**

The following observations were made on the operative cases of the III Surgical Service of the Boston City Hospital during the months of December, January and February past. The objects were to ascertain more definitely the presence of minor undesirable after effects in the Hospital patient.

The conditions investigated were :

1. Vomiting
2. Nausea
3. Headache
4. Cough.

In 94 cases notes on all of these conditions were obtained—in 158 notes on vomiting alone.

The cases were roughly  $\frac{2}{3}$  male,  $\frac{1}{3}$  female. They were taken as they came to operation, without regard to condition or to the character of the operation. In 5 cases ether was administered immediately after entrance,—these were emergency cases and had eaten a full meal within 3 hours.—The other cases received the usual Hospital breakfast 1 pint of beef tea,—given at 7 A. M. The operation took place usually between the hours of 10 and 12 A. M.—and as a rule nearer the latter than the former limit. Reports upon the vomiting were obtained from the etherizer, and from the nurse to whose care the case was resigned by the etherizer. The nature of the operation varied from opening an abscess to laparotomy and trephining,—the duration of the ether from primary anaesthesia of a few moments, to profound anaesthesia of two hours.

Of 158 cases in which the vomiting alone was investigated—in 53 it was present, about 33 per cent. In these cases it could not be demonstrated that any constant relation existed between the character of the operation, or the duration of the anaesthesia and the vomiting. More than once it happened that patients in excellent general condition vomited more profusely after a short, simple operation than others who were on the table for more than an hour. I have since noticed the same peculiarity in out-patient cases who walk into the Hospital and go home after the operation.



In regard to the severity of vomiting,—it was present in moderate degree in a large majority of cases; in these cases the patient vomited only once or twice, and at times the vomitus consisted only of mucus. It might be said that vomiting was considered present if there were spasmodic contractions of the diaphragm or if only a small quantity of mucus was discharged from the mouth. In about 15 per cent. of cases the vomiting was severe, but in none dangerous.

How or why ether produces vomiting has not, I believe, been definitely shown. In a general way it is supposed to be in proportion to the amount of ether administered. It must also depend, to a certain degree, upon the constitutional peculiarities of the patient. The age of the patient apparently has no influence. It has seemed to the writer that vomiting is present to a considerably greater extent in private than in Hospital patients, and apparently it is certain that the more skilful the etherizer, the less and less frequent will be the vomiting. This may depend upon the care with which the ether is administered and the fact that the patient has just enough ether to maintain unconsciousness and no more—and to attain this end it is absolutely essential that the etherizer shall not devote any of his attention to the operation.

In 94 patients the condition of nausea was investigated. It was present in 38. To these patients the

direct question of its presence was asked,—and care was taken to make them understand that nausea meant more than a sensation in the stomach which immediately preceded, or accompanied the vomiting. The nausea was usually moderate in amount and as a rule did not cause great discomfort. In a few cases however, the nausea was excessive and continued for hours; in 2 or more cases through the night and into the following day, and as a rule the cases in which the nausea was most severe, were not the cases in which the vomiting was excessive. Nausea was found to be present in cases in which there was no vomiting at all, and absent in cases in which vomiting was severe. It was present in about 40 per cent of all cases, or rather more frequently than vomiting.

The presence of headache was also made the object of direct questioning in 94 cases, and was present in 36 cases. In many of these it was extremely slight, and would never have been elicited except by leading questions. It was almost invariably frontal,—sometimes extending to the vertex, but very rarely to the occipital region. In two cases it was unilateral. It did not bear a constant relation either to the vomiting or the nausea. Its duration was in the majority of cases, from 2 to 6 hours. In a small proportion of cases it continued throughout the night. Whether it bore a constant relation to the conjunctivities which often

follows etherization, was not investigated. It was a distinctly less prominent symptom for the patient than either nausea or vomiting. In a few cases dizziness and a feeling of pressure throughout the head, were present instead of headache,—but have been classed here with the headache; in two cases the dizziness was very severe whenever the patient lifted the head from the pillow.

Cough was investigated in 94 cases; was present in 20 cases, and severe in 3. In these three there were moist rales in the lungs, particularly in the backs and bases of both sides, without dullness, and lasting from 24 to 48 hours; two of these patients complained of soreness in the chest. The others as a rule did not complain of cough until asked about it. It continued from 3 to 6 hours as a rule, and could not be found to bear any constant relation to the other symptoms above noted. The so-called ether bronchitis was certainly not present in more than 3 cases, and it was noted that those patients in whom mucous and froth were present in mouth and throat in large quantities during etherization, were not the cases in which cough was most annoying. As a rule there was but little expectoration, and often none at all. When present it was thin, white and mucoid, and probably originated in the throat and back of the mouth, where ether always causes irritation. It is possible that if ether is pushed in the beginning of the etherization, the development of this cough is favored.

It is interesting to notice that of 94 cases carefully examined, only 20 were free from all unpleasant after symptoms. If this is true in this class of patients, who are as a rule strong, healthy, and not given to exaggerating symptoms, it is more apt to be true of private cases, who are more easily influenced by irritants of any sort, who suffer pain more acutely, and usually look forward to an operation with considerable apprehension. This has seemed to the writer to be the case although statistics are not at hand to prove it.

The etiology of the cough, and the rarer cases of bronchitis is probably that of simple irritation of throat or lungs. The headache may be due to the congestion which is known to occur during anaesthesia, but why the pain should be so frequently frontal only, is not explained.

The writer has been unable to find any satisfactory theory to explain why vomiting and nausea occur after ether. Reflex irritation, or irritation of the vomiting centre are certainly sufficiently vague. Vomiting may be caused by so many and so different agents, that it is difficult to offer an explanation which will cover all conditions. Vomiting may be produced through irritation of almost all the special senses,—as well as through direct irritation of the stomach itself, internally or externally. Certain drugs, and particularly the sulphate of atropine in

1-60 grain doses, certainly tend to diminish the vomiting, as well as the excessive secretion of mucus. Absence of food before and plenty of air during etherization also tend to minimize it. But how to eradicate is not evident.

DR. J. B. OGDEN read on the

**“EFFECTS OF ETHER ON THE KIDNEYS”—A STUDY OF  
75 CASES.**

(From the Clinical Laboratory of the Boston City Hospital.)

In 1895 a series of observations was undertaken in order to determine, if possible, the actual effect of the elimination of ether on the Kidneys.

The work was carried on with the co-operation of Dr. Abner Post, from whose service (surgical) selected cases were taken for observation.

The success of the work was obviously dependent on a very careful examination of the urine before ether and then a similar examination after the ether had been given.

The urinary examination in each case was as follows: Color—Reaction—Specific Gravity—Tests for Albumin and Sugar—Microscopical examination of the Sediment. The test for Albumin was made by first filtering the urine in order to remove any and all suspended matter, the urine was then placed in a wine glass and colorless nitric acid allowed to flow down the

side of the tilted glass, using about  $\frac{1}{3}$  as much acid as urine. This preparation was then placed on a table in good light (avoiding direct sunlight) and a dark cloth adjusted obliquely at the side and slightly in front of the wine glass. If the slightest cloud or haze could then be seen just above the junction of the acid and urine it was designated as the Slightest Possible Trace of Albumin. If, still using the dark background, the cloud was found to be somewhat more distinct it was termed a Very Slight Trace.

The Fehlings test for Sugar was used in every instance.

The urinary sediment was carefully examined for formed elements, especially for casts and blood globules, and was always given the same attention whether Albumin was present in the urine or not.

If the urine was free from Albumin, the sediment was invariably found to be free from casts or blood globules.

An effort was made in the selection of the cases to take only those having little or no renal disturbance before administering the ether. Urines containing more than a small amount of pus and blood were eliminated.

The cases studied were, for the most part, those requiring a minor operation and consequently a very small loss of blood, so that we can practically exclude the effect of Acute Anaemia as regards any renal disturbances.

The total number of cases studied was 75.

**ALBUMIN.**—In 34.6 per cent. of these cases albumin was not found before but was found after the ether.

In 34.6 per cent., albumin was found before, and was increased after, the ether.

The total percentage of cases then, showing albumin, or an increase in the albumin after ether was 69.2 per cent.

In 26.6 per cent. of the cases there was no increase in the quantity of albumin after the ether.

In 1.54 per cent., albumin was not found before or after ether.

In 1.33 per cent., albumin was found before but was considerably less after the ether.

In 1.33 per cent., albumin was found before, but was absent after ether. In these last two instances a few blood globules were accountable for the variation in the quantities of albumin, as casts were not found in either case.

As we well know, albumin may be present in the urine without the presence of renal elements; in other words, without any renal disturbance or disease. It is therefore necessary for us to consider the presence or absence of renal casts, in order to judge of the presence, and to a large extent, the degree of renal disturbance.

**CASTS**—In 14.6 per cent. of the cases, renal casts were found in the sediment before ether, and were in-

creased in number after the ether. In 57.3 per cent. casts could not be found before, but were present after.

This makes a total of 71.9 per cent. of the cases in which there was a renal disturbance or an increased renal disturbance as shown by the number of casts.

(\*) In 22.6 per cent. casts were found before, and no change in the relative proportion after ether.

In 5.3 per cent. casts could not be found either before or after the ether.

It seems that 22.6 per cent. of the cases passed a more concentrated urine after the ether than before, and this brings up two important points to be considered.—

1st. Whether or not a part of the renal disturbance may not have been due to the elimination of a more concentrated urine after than before the ether ?

An analysis of the cases under consideration shows that only about 10 per cent. passed a urine which was highly concentrated after the ether, the remainder (12.6 per cent.) passing only a slightly concentrated urine.

There is very little doubt but that a highly concentrated urine may set up an active hyperaemia of the kidneys. In the light of this, it will be necessary to deduct this 10 per cent. from the 71.9 per cent. of cases (see above) making a total of 61.9 per cent. of all cases in which the kidneys were affected, apparently, by the ether.



2nd. Because of this concentrated condition of the urine, whether or not there may not have been a relative increase in the quantity of albumin or the number of casts?

This can be given a negative answer, for it was found that in this 22.6 per cent. of the cases, such a relative increase in the albumin and casts did not exist (compare above \*).

The quantity of ether given these cases varied from 100 to 800 c. c. and the length of time under the influence of the ether from 10 minutes to  $1\frac{1}{2}$  hours.

There seemed to be no relation whatever between the amount of ether given, and the length of time that the patient was under its influence and the severity of the renal disturbance, for there were generally as many casts after a small operation and a small quantity of ether, as after a larger operation and a larger amount of ether.

As a rule the length of time that casts were found in the urine after ether, when they were not present before, varied from 3 to 10 days.

Some of the cases could not be watched for a longer period than this, so that this data is far from being complete. Sugar was found in the urine of only one of the 75 cases after ether, there being none before. Although the amount of sugar was too slight to quantify, it was eliminated in traces for 3 days, then entirely disappeared. So far as I was able to judge the

quantity of albumin and number of casts was not affected by the sugar, as both albumin and casts continued some days after the sugar had disappeared.

The urines of children after ether did not show evidence of any more marked renal disturbance than those of adults.

DR. M. W. RICHARDSON read, by title, a paper  
“ON THE BACTERIOLOGICAL EXAMINATION OF THE  
STOOLS IN TYPHOID FEVER, AND ITS  
VALUE IN DIAGNOSIS.”

(From the Laboratory of the Mass. General Hospital.)

In investigating stools for the typhoid bacillus the greatest difficulties have arisen from the other bacteria present. These have been a disturbing element, first, because their colonies often resemble markedly those of typhoid, and secondly, because, in their growth, they often completely liquefy the gelatin before the typhoid colonies have a chance to grow. This latter difficulty can, to be sure, be obviated by the use of agar, but even then the colonies lack a characteristic appearance, and many have to be picked up and verified, in the hope that one or more will prove to be typhoid.

The potato gelatin of Holz partially remedied these difficulties. This medium, by its acidity, prevented the growth of a number of the disturbing bacteria,

and this inhibitory power was still further increased by the addition of .03 per cent. of carbolic acid. Upon this medium both typhoid and colon bacilli grew, but the typhoid colonies were said to be perfectly characteristic, small, pale, oval, and translucent.

Elsner (*Zeit. für Hygiene*, 1895, XXI. p. 25) made use of the potato gelatin of Holz, but substituted for the carbolic acid the iodide of potash in the strength of 1 per cent. This method has been used by a number of observers with very considerable success. It has not been at all uncommon to find the organisms as early as the 7th. day of the disease, and, though, with convalescence, the bacilli disappear rapidly from the stools, still they have been found as late as the 36th. and 41st. day after the temp. had reached the normal point.

Indeed the method has been more than successful, for Remlinger and Schneider claim to have found typhoid bacilli in the stools of 5 out of 10 non-typhoidal patients,—a leukaemia with fever, an acute dysentery, a case of acute miliary tuberculosis, and 2 chronic malarías. These latter results, are of course, very remarkable, but I think they must be accepted with great reserve until confirmed by other observers.

My own investigations had the following objects in view.

I.—To test the Elsner method as such.

II.—To compare it with the newly-discovered serum-reaction; to see whether there might not be cases where no serum test was to be obtained, but where bacilli were to be recovered from the stools.

III.—I desired to determine the accuracy of the assertions of Remlinger and Schneider as to the ubiquity of the typhoid bacillus.

The latter part of the work was done by aid of a new agar medium as recommended by Capaldi. (*Zeit. für Hygiene*, Bd. XXIII. Th. III.) This medium is easier to make up than the Elsner gelatin, and my results with it have been at least as good as, if not superior to those with potato gelatin. Its advantages are—

I.—No chance for liquefaction.

II.—The typhoid colonies are much larger, and thus more easy to pick up. With the gelatin the colonies were often so small that it was impossible to make inoculations from them.

III.—Colonies are ready for examination in 18° rather than in 48° or 72°.

The only disadvantage is that the colonies are not quite so characteristic as upon the gelatin.

Everything considered, however, the Capaldi agar has been quite satisfactory. The only difference in procedure is that with the agar, the plates are first poured and hardened. The suspected material is then spread upon the surface, whereas, with the gel-

atin, the material is thoroughly mixed with the medium while the latter is melted.

Although the two methods were used in my investigations, the results, for the sake of simplicity, will be considered together.

In all there were examined 100 stools in 49 different individuals. Of these 49 cases 13 were typical typhoids in the febrile stage, and in these 13 cases 55 stools were examined.

The isolation of the typhoid bacillus was accomplished in 10 out of 13 febrile cases in 19 out of 55 stools. In one case the bacilli were found on what was said to be the 5th. day of the disease, but the history was somewhat indefinite, and the disease was probably farther advanced. Two cases were positive on the 11th day. In the other 7 cases the typhoid organisms were discovered first on the 12th., 20th., 23rd., 27th., 28th., 29th., and 36th. day respectively.

Seven out of 10 cases were positive upon the first examination. In these cases, therefore, it is impossible to say how much sooner the organisms might have been found had the stools been received earlier. In the three other positive febrile cases the bacilli were isolated only after several examinations on the 20th., 27th., and 28th., days. In testing the cultures obtained from these positive cases the bacilli were examined:—

I. As to their size, shape, and motility.

II. Growth in gelatin stab and slant.

III. Litmus milk.

IV. Sugar agar.

V. Peptone sol. for indol.

VI. Potato.

VII. Bouillon.

VIII. Two new test solutions of Capaldi.

IX. Reaction to typhoid serum.

Of the three negative cases one was unsatisfactory because the stools could be examined but once, and that on the 6th. day of the disease. The other two negative cases were typical typhoids, and one went through a relapse as well. Although six stools in one case and eight in the other were searched, and that, too, by both methods, Elsner and Capaldi, I was never able to isolate the typhoid bacillus.

All these 13 cases gave well-marked serum-reactions at least two days before the organisms could be recovered from the stools. We see, therefore, that, as far as this series of cases goes, the serum reaction proved itself much superior as a diagnostic aid.

There are cases reported, however, such as those of Biggs and Park, Breuer, Achard, Cahill, and Thoinot, where the serum reaction did not come either until late in the disease, till convalescence began, or perhaps till the occurrence of a relapse. In such cases it would seem as if a bacteriological examination of the stools would be of great value, for

the appearance of the bacilli in the dejections of the second week is a quite common occurrence. In fact Kolle has reported two such cases where the serum reaction was obtained first on the 16th. and 17th. days, but where the bacilli were cultivated from the stools on the 10th. and 11th. day.

To continue with my own cases—2 stools in 2 cases of doubtful typhoid were examined with negative result. These 2 cases never presented any serum reaction, and were practically convalescent when investigated.

Twenty-three stools of thirteen convalescent typhoids were examined, with but one positive result, and that on the first day after the fever had disappeared. In one case of this series the search was kept up until the 24th. day of convalescence, but the results were all negative.

Seventeen stools of seventeen non-typhoidal cases were also all negative. Included in this series were cases of grippe, pneumonia, sepsis, meningitis, otitis-media, endocarditis, gonorrhœal rheumatism, and neurasthenia.

Furthermore, the intestinal contents from the autopsies of 12 individuals were also examined, with the object that, in case of a positive result there might be no doubt as to the diagnosis. The diseases represented in these autopsies were all entirely non-typhoidal in character, and the results absolutely negative.

## CONCLUSIONS :

I. The isolation of typhoid bacilli from the dejections of persons sick with typhoid fever is, in the great majority of cases, a practicable procedure.

II. With the appearance of convalescence the organisms disappear rapidly from the stools. They may persist, however, several weeks. This fact is important as regards disinfection.

III. The value of the serum test in diagnosis is greater, in most cases, by reason of its earlier appearance, and the ease with which it can be carried out. In those cases, however, where the specific blood changes necessary for the serum reaction do not appear till late in the disease — convalescence, or relapse — in such instances the bacteriological examination of the stools would be of great value.

IV. The results of Remlinger and Schneider who declare the typhoid organism to be ubiquitous, could not be confirmed by the writer.

Mr. F. H. PRATT made some remarks on

“ THE CIRCULATION THROUGH THE VEINS OF  
THEBESIUS.”

Various experimenters in cardiac physiology have had occasion within recent years to maintain an artificial circulation through the coronary arteries. Under these conditions, it was frequently noticed that the circulation fluid not only escaped through the



coronary veins into the right side of the heart, but also found its way in small quantities into the left side, where it was found, ordinarily, collected in the left ventricle. Since, in these cases, the heart was so isolated as to eliminate entirely any connection with the lungs, the only channel of intercommunication left open was through the veins of Thebesius. These are minute vessels, first discovered by Thebesius early in the last century, which open through small foramina in the endocardial surfaces of the mammalian heart.

All opinions heretofore held regarding the physiology of these vessels seems to rest upon the assumption that they serve the purpose of conveying venous blood from the walls into the cavities of the heart. So far as I have been able to learn, no experimental physiological work has ever been done on the veins of Thebesius.

The objects of the present research have been—first, to determine what portion of the coronary blood flows from the left side of an isolated heart; second, to trace the anatomical connection of the veins of Thebesius with the coronary vessels; third, to establish the function of the former by experiments upon the living heart.

To determine the relative amounts of flow from the right and left sides of the heart, injections of defibrinated blood were made into a coronary branch of the

extirpated heart of a mammal, and the outflows from both ventricles measured. This was accomplished by tying of all venous inlets, and inserting canulas—one in the pulmonary artery, another in the left ventricle through the left auricular appendix. In this way, quantitative results, not yet complete enough for publication, were obtained.

At this point in the investigation, it occurred to me that these “veins” of Thebesius might possibly perform the function of arteries, as many of them are situated in the distributing, and not in the receiving chambers of the heart. The plausibility of this was strengthened by the analogy between these vessels and the fine passages found in the heart of the frog, which serve the purpose of nourishing the walls with blood direct from the ventricles.

On the basis of this hypothesis, experiments were now carried on from both an anatomical and a physiological standpoint. Injection masses of starch and celloidin failed to pass from the coronary arteries of the dog and ox into the heart cavities. Similar injections into the coronary veins, however, were successful. The passing of such thick masses indicates a close connection between the vessels of Thebesius and the coronary veins.

It now remained to determine whether or not an isolated heart may be maintained in rhythmic contraction through nutrition from the endocardial walls

alone. A series of experiments according to the following methods was now begun, mainly with the freshly excised heart of the thoroughly etherized cat. Blood from a carotid artery is defibrinated, and the heart excised. The auricles are tied off from the ventricles, and both coronary arteries ligated. A large canula is introduced into the right ventricle through the pulmonary artery and secured by a ligature. This canula is now supported vertically, so that the heart shall hang from its lower end, and defibrinated blood poured in from the top so as to fill the ventricle and rise in the canula to a height of several inches.

The ventricle is distended, and all the coronary veins become filled with blood; the coronary arteries remain empty. The ventricle begins to contract rhythmically—slowly at first, but gradually attaining the normal rate. Suspending the heart in warm normal saline solution facilitates the action. The blood within the ventricle and in the veins becomes venous, and, if contractions are to be sustained, must periodically be renewed. If a vein is opened, a small but steady outflow of blood occurs. Increasing the load beyond that furnished by a blood column of four or five inches lowers the force of contraction. Contractions may be kept up by this method for several hours. Ringer's solution substituted for blood has failed to sustain contractions. Similar results have

been obtained with the left ventricle, though not so marked. It is to be noted that, so far as observed, contraction occurs in that ventricle *alone* into which blood has been introduced. When both are supplied, both contract, and simultaneously. Never in the course of an experiment have the coronary arteries been observed to fill with blood.

The results of these experiments furnish conclusive evidence of genuine nutrition. The blood becomes venous, and must be renewed in order to sustain contraction. That the contractions are not due to mere mechanical stimulus is proved by the fact that Ringer's solution fails to carry on the process. A genuine circulation may exist between the ventricular cavity and the veins, as shown by the constant outflow following the opening of a vein. This outflow, however, does not appear to be, so far as nutrition is concerned, a necessary condition, since reduced blood finds its way back to the ventricle in any case,—probably by the same channels through which it enters the cardiac tissue. The relation of the circulation in the veins of Thebesius to the beat of the heart, and the exact nature of this circulation in life are points not yet determined.

An important bearing of these experiments lies in the possible application of the results in pathology. The possibility of a direct nutrition from the ventricles may serve to explain many cases where a gradual

stoppage of the coronary arteries has failed to destroy life. It does not seem unreasonable to suppose that during the gradual withdrawal of nutriment from the heart-walls, the vessels of Thebesius have assumed an important function in allowing of sufficient infiltration of blood to prevent the process of infarction.

With a view to settling definitely the anatomical connections of the veins of Thebesius, corrosion preparations are now in process of digestion.

The question as to whether or not these vessels are really homologous with the structures found in the batrachian heart can doubtless be settled by a comparative study of the animal series. This problem may well be made the subject of a separate investigation.

DR. J. L. GOODALE presented, by title,

“AN ETIOLOGICAL STUDY OF ATROPHIC DISEASE OF  
THE UPPER AIR PASSAGES.”

In order to submit the current opinions regarding the predisposing causes of atrophic states of the upper air passages to the test of a systematic examination, the writer investigated 200 cases exhibiting such conditions. There were excluded from consideration the following nutritive abnormalities:

I. The hypoplasia of the turbinates occurring in chlorotic females;

II. The undeveloped condition of the nasal structures found in children with post-nasal obstructions;

III. Anaemic conditions occurring in general malnutrition ;

IV. Pressure-atrophies from septal deviations and tumors. Syphilitic disease was also excluded.

The cases of genuine atrophy were divided into :

I. Non-fetid atrophy ; i. e., atrophic states of the nasal structures, not accompanied by fetor, whether or not involving also the pharynx and larynx ;

II. Fetid atrophy of the nasal structures, whether or not involving the pharynx and larynx ;

III. Atrophic states of the pharyngeal mucous membranes, not accompanied by atrophy of the nasal structures.

The etiological relation of these states was examined with reference to age, sex, sexual functions in the female, general nutrition, abnormal potency of the anterior noses, associated hypertrophic conditions of the mucous membrane and of the lymphoid structures.

A brief summary of the results of this investigation makes evident the following facts :

Both fetid and non-fetid atrophy occurred from two to three times more frequently in females than in males, while the pure pharyngeal atrophy occurred with nearly equal frequency in both sexes.

The first two forms began generally between the ages of 5 and 15, while the pharyngeal form was not found before 20.

While menstrual anomalies are not strikingly fre-

quent, 4 per cent. non-fetid and 26 per cent. fetid cases experienced marked aggravation of the condition during menstruation.

Three-fourths of all cases showed good health and nutrition.

Abnormal patency of the anterior nares was found in 40 per cent. non-fetid, 60 per cent. fetid cases, and 10 per cent. of the pharyngeal form.

Distinct hypertrophy of the adjacent mucous membrane occurred only in isolated instances among the fetid and non-fetid nasal forms, while in the pharyngeal type, hypertrophy of the nasal mucous membrane was present in nearly half the cases.

Adenoid enlargements occurred in 20 per cent. of the non-fetid, in 7 per cent. of the fetid, and in 10 per cent. of the pharyngeal atrophies.

Tonsillar hypertrophy occurred in about 20 per cent. of each of the three forms.

The weight of these facts is distinctly against the theory that non-fetid and fetid atrophy is the sequel to a pre-existing hypertrophy. On the other hand, they are in direct corroboration of the supposition that these two conditions are primarily atrophic processes, whether or not we consider them to originate in the action of a specific micro-organism.

The conditions present in the form of pharyngeal atrophy are more complex and not productive at present of inference as regards etiology.

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[Number 16 is the last that will be for free distribution. The amount of material offered is so great that the funds of the society will not permit of the continuance of the present plan. In the fall, however, the "Journal" will begin the second volume in an enlarged form, adhering to the fundamental ideas of *authors' abstracts* and *prompt publication*, but a subscription price will be asked for. Of this due notice will be given. An index of the numbers already issued will be sent out shortly. — EDITOR.]

At the meeting held June 15, 1897, Dr. E. M.  
HARTWELL spoke upon

“PUBLIC BATHS IN EUROPE.”

He exhibited a series of lantern slides illustrating — as regards plan and structure — some of the most typical European forms of public baths: viz., (1) floating swimming baths; (2) combination swimming and cleanliness baths; (3) cleansing baths for soldiers, school children, and workmen. The illustrations included views and plans of British, French, German, Austrian, and Hungarian bath establishments.



The movement for providing the poorer classes in crowded towns with bath-houses at public expense, and available throughout the year, had its beginning in Liverpool. In 1842 the corporation of Liverpool, which had maintained a floating bath-house on the Mersey since 1794, erected the "Frederick-street Bath and Wash-house," which was the first of its kind, and served as a model for most of the British and continental public bath establishments built prior to 1870. The wash-house feature of the Frederick-street Bath owed its adoption to the success of a private wash-house established by a benevolent Liverpool woman during a cholera epidemic. London and other English cities speedily followed the example of Liverpool. In 1854 there were twenty-three towns in Great Britain possessed of public bath-houses, representing a capital outlay of over £180,000.

In 1894 there were in England 191 municipal boards, mostly acting as local sanitary authorities, engaged in the management of bath and wash houses, and open bathing places. The number of separate establishments now considerably exceeds 200 — as many local boards have charge of several establishments. Liverpool and Manchester, for instance, have each 9 public baths. Open-air swimming pools in public parks are found in Manchester, Birmingham, and London. But the typi-

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cal form of British public bath is a monumental structure, containing swimming pools, private tub-baths, and public laundries. Vapor baths are found in many establishments. As a rule British bath-houses are elaborate and costly. The costliest of them is the Buckingham Palace Road Bath, belonging to the Parish of St. George, Hanover Square, in London. It cost upwards of £48,000. The policy of building comparatively unpretentious and inexpensive baths is gaining favor; and experience now shows that very serviceable establishments can be erected in England at a cost of from £7,000 to £10,000.

In 1894 the outstanding loans for municipal bath and wash houses amounted to £1,270,000 in round numbers. In that year the receipts of local authorities in England charged with the management of municipal baths amounted to £428,000, their expenditures being £404,000.

Hamburg, in 1855, was the first German city to build a bath and wash house of the British type. As a rule the larger German cities now possess municipal baths of the monumental type. Most of them have been built since 1870, but are without wash-houses. In Germany it is rather more common than in Great Britain to keep the swimming pools open throughout the year. In the period 1886-1896 nearly nine millions of marks were

expended upon public or semi-public bath-houses of the combination type. The best German examples of this type are more highly developed than the newest and most costly of the British municipal baths, being more generally supplied than the latter with rain baths, douches, and vapor baths.

"People's bath-houses" of various sorts have increased rapidly in number in Germany since 1883. They are frequently found in cities also having costly monumental establishments. People's baths rarely have swimming pools. Warm tub and shower baths constitute the leading features in such establishments. In not a few of them shower baths only are provided. People's bath-houses, costing from 20,000 to 50,000 marks, are steadily increasing in number and popularity in Germany.

Vienna has 10 municipal *Volksbäder* which contain shower-bath accommodations (without tubs or pools) for both sexes, and it is intended to furnish each of the 19 districts of the city with at least one such *Volksbad*. The charge for a bath in these establishments amounts to about 2½ cents. In 1893 in 9 *Volksbäder* 525,815 shower baths were taken at a net cost to the city of 18,000 gulden.

Rain baths (*Brausebäder*) of the "Lassar-Grove" type, so called, are particularly worthy of study by American sanitarians and philanthropists. On account of their simplicity, cheapness, and effective-

ness, their use has rapidly increased in Germany during the last dozen years. They are now comparatively common, not only in military barracks, school-houses, and people's baths, but also in industrial establishments, such as foundries, mills, chemical works, gas works, and government shops. In no part of the world are workmen's baths so common as in Germany.

The experience of the leading commercial and industrial cities in Europe during the past fifty years shows that the provision of public baths is a wise policy. As a rule such establishments have proved popular, and largely self-supporting so far as running expenses are concerned. Though the policy of erecting imposing and costly structures has many advocates, there is a steadily growing opinion among experts that relatively small and inexpensive cleanliness baths, so placed as to be easily accessible to the dwellers in congested districts, constitute the most useful form of public bath establishment.

Dr. R. W. LOVETT made

“A CRITICISM OF THE ACCEPTED POSITION OF THE FEET IN MILITARY AND GYMNAS TIC DRILL.”

Two positions of the foot may be recognized.

(1.) What may be called the normal, where the inner condyle of the femur, the inner malleolus, and the inner border of the great toe are in the same

vertical plane. This position is maintained by muscular contraction, and is the position of strength and vigor.

(2.) The pronated position, which is a displacement of the foot outward in relation to the leg. This is the position of ligamentous as distinguished from muscular support — the position of weakness and fatigue. It is a pathological condition in itself, and it is often the initial stage of flatfoot.

The normal position passes into the pathological chiefly by a motion at the medio tarsal joint. The toes remain still, and the leg rotates inward.

The weight-bearing surface of the foot can be observed only through glass by means of a mirror set under the glass reflecting the image of the pressure surface of the foot. Normally the outer border should bear weight in this position. In pronation the outer border lifts, and only two islands are in contact with the glass.

If the feet are placed parallel to each other and straight forward, the weight is thrown more upon the outer border of the foot than if they are everted to an angle of  $90^{\circ}$  to each other; in other words, the angle of eversion of  $90^{\circ}$  tends to throw the weight more to the inner side of the foot in standing, and in this way must favor pronation.

Inasmuch as pronation is the attitude of weakness and not of muscular strength, it is an open

question whether it is wise to cultivate the position of eversion of the feet in educational exercises. The subject is one meriting careful investigation.

Dr. W. T. COUNCILMAN demonstrated

“PATHOLOGICAL CASES,”

showing microscopic specimens from the lung in a case of diphtheria, which contained large numbers of diphtheria bacilli in the tissue. Pulmonary lesions in the form of small foci of broncho-pneumonia are constantly present in the lungs in cases of diphtheria. Most often the diphtheria bacilli are not found on microscopic examination, or they are present only in the bronchi along with other organisms, chiefly streptococci. In this case there are not only the foci of broncho-pneumonia, but in places an actual necrosis and breaking down of the tissue resulting in abscess formation. The diphtheria bacilli are in such numbers that when observed under a low power they appear as blue masses. They are present in groups, and enclosed in the pus cells. It appears from this that the bacilli may be not only the causative agent of the broncho-pneumonia of diphtheria, but may actually lead to abscess formation.

The specimen was hardened in Zenker's fluid, and stained with alkaline methylene-blue and eosine.

Dr. T. LEARY presented a report of two cases of

“DIPHTHERITIC GASTRITIS.”

E. C., 5 years of age, was admitted to the South Department, Boston City Hospital, April 17. Little history could be obtained except that child had been sick with a sore throat for three days. Child much prostrated. Temperature, 101.3; pulse, 120; necrotic membrane on both tonsils. Slight broncho-pneumonia of left back. Marked septic odor. Cultures from throat showed K.L. Child became progressively worse, and died April 19, — 48 hours after admission. There had been no vomiting, food being taken in the ordinary way with little difficulty.

Autopsy April 20, 1897.

There were multiple subcutaneous ecchymoses over trunk and limbs.

Posterior nares covered with thin gray membrane, easily removed. Both tonsils completely necrotic, showing a deep central loss of substance. Tonsils are ragged, brownish black, with shreds of tissue hanging loose, and have an extremely foul odor. Necrosis extends to the tissues about tonsils, thence down over the root of tongue and over the anterior surface and tip of epiglottis, where it is superficial.

Pharynx injected; mucous membrane intact.

Cervical lymph glands show focal necroses.

Broncho-pneumonia in base of left lung.

Spleen. — Multiple miliary necroses, confined to malpighian bodies. General lymphatic hyperplasia.

Stomach. — Beginning sharply at cardiac orifice and ending almost as sharply at pyloric orifice, the mucous membrane is covered by a thick, ragged, greenish-brown, gangrenous pseudo-membrane, which emits an exceedingly foul odor; is thicker apparently over the rugæ, and is rather easily removed, leaving a red granular surface beneath. The stomach contained considerable black semi-fluid material. The whole of stomach wall is thickened; peritoneal surface smooth, and of a dull green color. Cultures showed K.L. in tonsils, streptococci in lung. K.L. and streptococci in liver, spleen, and ears, a variety of organisms in stomach, K.L. and streptococci being abundant.

Section of stomach shows enormous fibrinous exudation on the surface, with necrosis of the epithelium, involving in places only the upper layer, in places extending down to and through the muscularis mucosæ. In places there are extensive hæmorrhages in the tissue. The lymph follicles are not enlarged. The fibrinous exudation is thick, heavy, and in places beautifully reticulated. The submucous tissue is œdematous, distended, more



or less infiltrated with cells. The muscle coats are normal; stained for bacteria, with a low power, there are numerous masses in the diphtheritic membrane, in the surface, and in places in the submucous tissue.

These bacteria are principally large streptococci. Scattered over the surface of the false membrane are masses of bacteria, principally bacilli in great variety. The masses of bacteria in the mucous membrane and submucous tissue are exclusively streptococci.

Numbers of groups of perfectly definite diphtheria bacilli are found in the diphtheritic membrane, generally comparatively low down.

J. E., 5 years of age, was sent to the South Department, May 29, from the Massachusetts Eye & Ear Infirmary, with diphtheritic conjunctivitis of both eyes. There was desquamation over whole surface of body and scalp. There was also present an erythematous rash suggesting measles. Necrotic membrane over tonsils and pharynx. Cultures from nose, throat, and both eyes positive. Died June 8, 1897. There had been no vomiting.

Autopsy June 8.

There was present diphtheritic conjunctivitis, rhinitis, tonsillitis, pharyngitis, and otitis. Pulmonary, glandular, and intestinal tuberculosis.

**Stomach.** — Beginning at cardiac orifice there is an area along the lesser curvature, in which the mucous membrane is eroded to a considerable depth in irregular patches running toward the pylorus. The surface is red and granular, with an occasional patch of yellowish adherent membrane. From this area extended lines of ulceration for a considerable distance just alongside the summit of the rugæ. Just above pylorus, along lesser curvature, is another irregular patch of erosion which is in connection with first area by the slender line of ulceration.

#### CULTURES.

**Heart.** — Sterile.

**Pharynx and lung.** — Abundant K.L. and staph. aureus.

**Liver, spleen, kidney, and cervical glands.** — Pure streptococcus ; gastro-hepatic glands and both middle ears, streptococcus and K.L.

Microscopical preparations have not as yet been made.

There have been reported very few cases of diphtheritic gastritis, Kahn being the only author who regards the process as not uncommon. The two cases above reported are the only ones which have been found in 136 autopsies on diphtheria at the Boston City Hospital. It is interesting to note that in both cases there was a general streptococcus infection in addition to the diphtheria, and that in

one there was tuberculosis, which agrees with the findings of observers abroad. There have been no cases reported in America in which there was bacteriological proof of the character of the process. Unfortunately, in the first case cultures were not taken from the gastro-hepatic lymph glands, although the presence of K.L. in cultures from the diphtheritic membrane, and their demonstration microscopically in the membrane would seem to offer satisfactory proof. There was no vomiting in either of these cases, the process was not suspected, and so tests of the stomach contents for free HCl. (which was found completely absent in one case reported by W. Soltair Fenwick before the London Pathological Society) were not made. It is also interesting that in neither of these cases was the œsophagus affected, infection having probably taken place by swallowing particles of membrane which passed over, but did not affect, the œsophageal mucous membrane.

Drs. THEOBALD SMITH and J. R. STEWART gave an account of

“SPONTANEOUS PSEUDO-TUBERCULOSIS IN A GUINEA-PIG, AND THE BACILLUS CAUSING IT.”

No excuse need be offered for the study of infectious diseases of the smaller mammals. The history

of bacteriology is a sufficient witness of their importance in furnishing information upon etiology.

The guinea-pig which is the source of this brief note was bought in Boston in November, 1895, for use in work upon diphtheria antitoxin. After two weeks the hind limbs became partially paralyzed. A small dose of toxin finally proved fatal.

On examination the liver contained about 12 abscesses from 2 to 8 mm. in diameter. The spleen was considerably enlarged and similarly permeated with abscesses. There was an abscess of the sixth right and of the ninth left rib at the vertebral articulation, and considerable enlargement of the greater part of both ribs. There was beginning disease of the sternal end of 5 ribs of the left and 2 of the right side. The name pseudo-tuberculosis was suggested by these focal lesions, although it is by no means a satisfactory designation.

Histological examination showed that these changes in spleen and liver were due to a purulent infiltration of the tissue, followed by disintegration centrally, and the formation of a connective tissue capsule on the periphery of each focus.

Cultures showed the presence in these foci of a bacillus which was to all appearances the cause, but which in pure culture has not thus far produced precisely the same changes observed in the spontaneous case.

The morphological characters are in brief as follows: Bacilli, about as large as the true colon bacillus, motile. Flagella grouped about body of bacillus like those of the colon and the typhoid bacillus. Bacilli stain promptly with basic aniline dyes. In some cultures the stainable portion of the bacillus is collected at the poles, leaving a central clear zone. This appearance is not uncommon with *B. coli*.

Among the biological characters, the following are of the most importance:

1. Ready growth upon the ordinary culture media in use. No pigment production.

2. No liquefaction of gelatine. Colonies resembling those of *B. coli* when the conditions of growth are very favorable, otherwise smaller.

3. No change in milk until after 3 or 4 weeks, when it becomes translucent, owing to a slow increase in the intensity of the alkaline reaction.

4. Growth on potato, feeble, whitish, sometimes absent.

5. No indol production.

6. Gas and acid formation in 1 per cent. dextrose bouillon.

Gas formula in the fermentation tube approximately  $\frac{H}{CO_2} = \frac{2}{1}$ . Total acidity 4.5 per cent. of a normal acid solution.

Neither gas nor acid appears in lactose and saccharose bouillon.

The pathogenic characters of this bacillus have been studied upon rabbits, mice, and guinea-pigs.

In rabbits, subcutaneous injection produced only an abscess at the point of inoculation. Injected into an ear vein 0.3<sup>cc</sup> of a bouillon culture proved fatal in 48 hours. The more pronounced lesions were: Subcutaneous veins distended with fluid blood. Liver large, pale, and showing very minute necrotic foci; spleen dark, large; lungs sprinkled with hæmorrhagic points; heart muscle fatty.

Subcutaneous injection of culture fluid, as well as feeding cultures on bread, proved fatal to the ordinary gray mouse in 4 to 6 days. The lesions seemed most pronounced in the intestines, which were distended with a yellowish fluid. Focal lesions not recognized.

In guinea-pigs the effect of subcutaneous injection varied considerably with the age of the animal and the quantity and age of the culture. Death ensued in from 1 to 2 weeks after inoculation. At the point of injection an abscess developed, whose size grew with the duration of the disease. The liver and kidneys showed the usual parenchymatous changes. In spleen and liver not infrequently disseminated, usually quite minute necroses.

Injection of small doses into the peritoneal cavity

is more promptly fatal and results in a fibrinous and cellular exudate covering spleen and liver and portions of abdominal wall. Effusions into both abdomen and thorax may be present.

Feeding the bacilli by pouring cultures on the food is fatal in from 4 to 8 days. In one instance there was marked infiltration of Peyers' patches and of the mesenteric glands.

Latterly there is evidence of a gradual attenuation, as the effect upon guinea-pigs is less certain. The fact that the disease found in the original case was not exactly reproducible experimentally need not militate against the etiology as here laid down. The conditions shaping infection and disease after infection are complex, and the resulting lesions may vary with the mode of infection, the number and virulence of the bacilli introduced, and the age and condition of the guinea-pig.

This bacillus is closely related to the bacilli which have been isolated from poisonous meat products and from the organs of those who succumbed to the poisoning. Among these outbreaks may be mentioned those studied by Gaffky, Gärtner, Van Ermengem, Kaensche, and Günther.

It is also closely related to the bacilli which call forth epizootics of swine pest or hog cholera in this country and in Europe, and to *B. typhi murium* of Löffler. All of these, the meat poison and the

swine pest bacilli, belong to one great group (or species) in virtue of the identity of their morphological and biological characters. Some members of the group exhibit more of the invasive or parasitic, others more of the toxic characters. The bacillus under consideration may be identical with *B. typhi murium*, and hence we have refrained from naming it and adding thereby to the confusion of nomenclature already beyond control.

Dr. F. B. MALLORY showed a specimen of

“ENORMOUSLY DILATED SIGMOID FLEXURE”

due to volvulus. The case was one of 20 years' standing. Distension occurred at irregular intervals and was relieved by rectal tube. No adhesions had taken place. At the time of the autopsy the sigmoid flexure measured 114 centimeters in length, and 22 centimeters in diameter at the point of greatest distention.

Dr. J. H. WRIGHT showed a

“HEART”

which presented congenital defects in the intra-ventricular septum, and in the mitral and tricuspid valves.

The defect in the septum had been compensated for by a cusp of the tricuspid valve, which was



adherent around the margin of the opening, effectually closing it.

The specimen was regarded as affording an example of the adaptability of an organ to pathological conditions.

The heart was that of a female child about eight years of age, dead of persistent intestinal hæmorrhages, which were associated with the presence of a Meckel's diverticulum.

Dr. G. N. STEWART, of Cleveland, Ohio, presented a preliminary note on

“THE RELATIONS OF THE ELECTROLYTES TO THE NON-ELECTROLYTES IN THE BLOOD—CORPUSCLES AND BLOOD—SERUM.”

1. The electrical resistance of defibrinated blood is from 3 to 5 times greater than that of the serum.

2. When defibrinated blood is centrifugalized, and samples taken from different portions of the tube, the electrical resistance increases with the proportion of corpuscles in the sample; *e.g.*, the resistance of a sample taken from the bottom of the tube may be 15 times that of the serum, or even more.

3. Since in such sediments there is always some serum between the corpuscles, the conclusion seems warranted that, in comparison with the serum, the blood corpuscles are non-conductors.

4. Two explanations of this fact suggest themselves :

(a) That the corpuscles, while containing dissociated ions, and therefore (on the theory of Arrhenius, etc.) capable of electrolytic conduction in their interior, are surrounded by a non-conducting envelope — an envelope, let us say, which refuses passage to the ions that exist in blood, but not necessarily an envelope structurally differentiated from the rest of the corpuscle.

(b) That throughout the whole substance of the corpuscle the bodies (inorganic salts) which would otherwise behave as electrolytes are combined with the non-conducting (non-dissociable) molecules (proteids and hæmoglobin), and thus rendered for the time non-dissociable.

5. An attempt has been made to decide between the explanations by breaking up the corpuscles in various ways, and determining the effect on the electrical resistance, and among others the following facts have been made out:

(a) On the addition to defibrinated blood of a quantity of distilled water sufficient to cause "laking," the resistance is either absolutely diminished, in spite of the dilution, or it is increased in a smaller proportion than is the case when serum is similarly diluted.

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